# Call-A.P.P.L.E.™

Volume V, Number 11 November 1982 $2.50 ($3.00 Canada, £1.75 UK.)


## Special Graphics Issue

EXPLORING THE WORLD OF A.P.P.L.E.:

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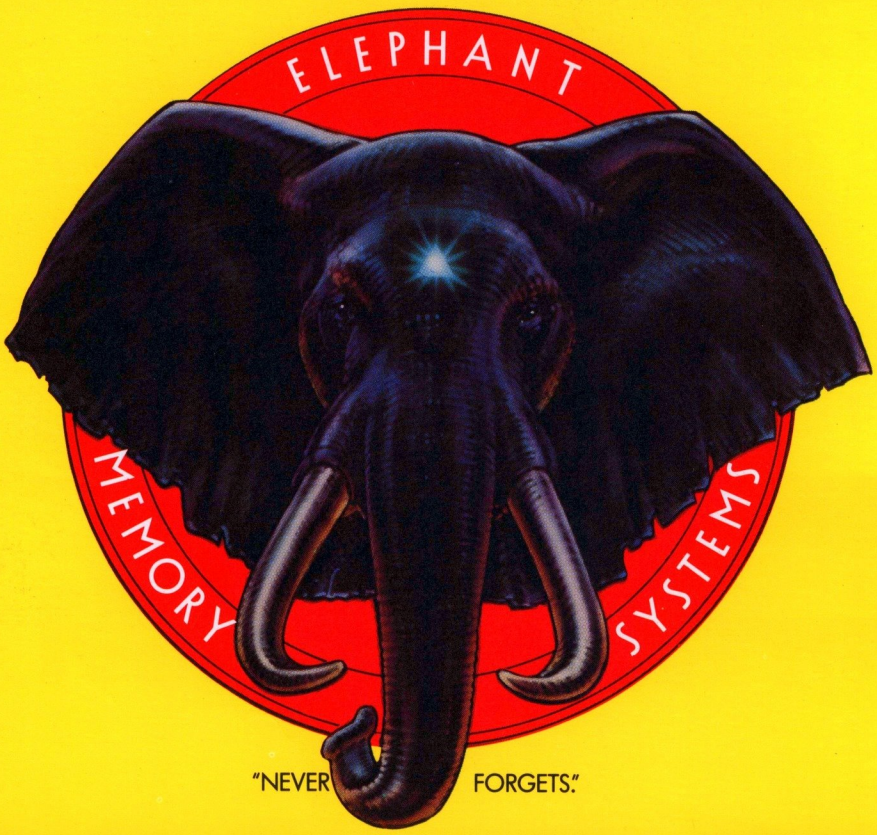


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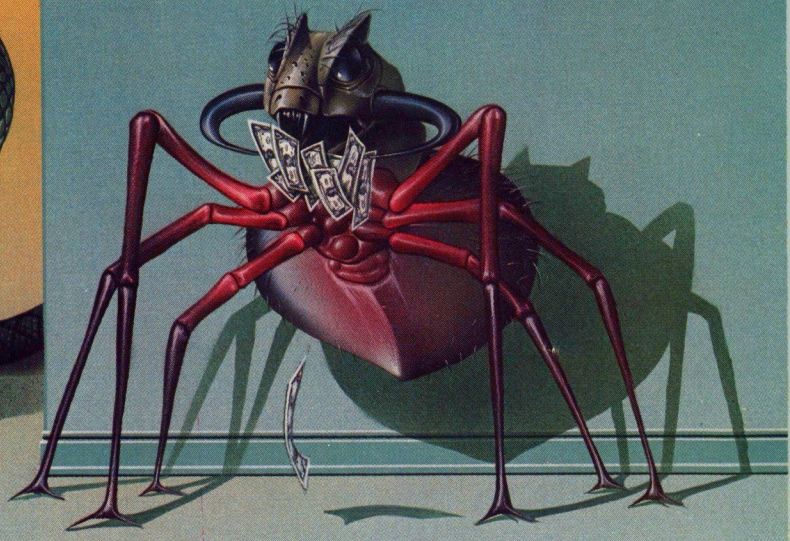

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**7:30 PM, Tuesday, November 16, 1982**
Seattle University Library Auditorium

**Guest Speaker**
Kirk Thomas
Robots

**7:30 PM, Tuesday, December 21, 1982**
Swan Computers
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**7:30 PM, Tuesday, January 18, 1983**

**Speaker and location to be announced**

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# Call-A.P.P.L.E.™

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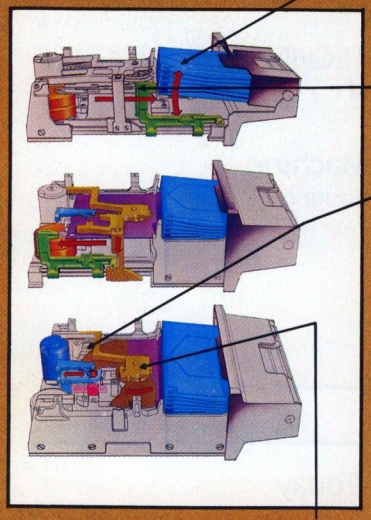

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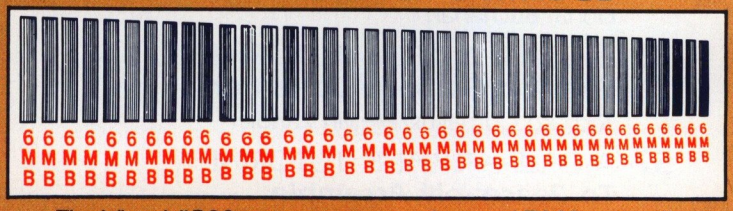


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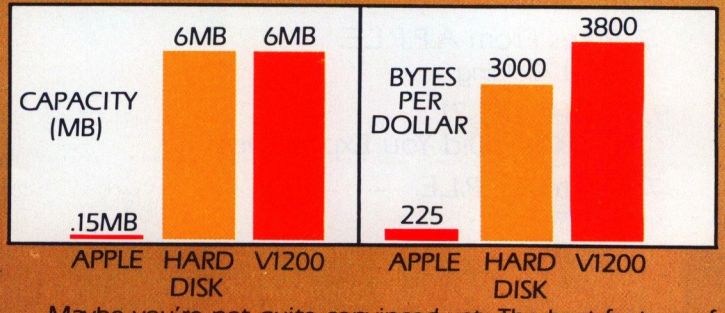


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# THE EDITOR BYTES BACK

**the editor**

WELCOME to our special hi-res graphics edition of **Call -A.P.P.L.E.** We often receive over a period of time story submissions on a single subject. Sometimes, as is the case with this issue, it works out exactly right to include a specialized section in **Call -A.P.P.L.E.**; other times we are overwhelmed by the amount of good material available on a specific subject. In this event, we can, out of the blue, decide to publish another issue of our companion magazine, **Call -A.P.P.L.E. In Depth.** This was what happened in October — We had so much good DOS info that we decided to do both a special section and another **In Depth.** The long and short of this is if you don't see your favorite subject covered, let us know — it may be in the works!

Back to the here and now, **M. A. Iannce** makes his initial appearance in our pages with a fine excursion into how hi-res works as **Exploring the World of Apple** explores hues and how to create them in **Color Me Apple.**

Another and entirely different application is that proposed by **Ian M. Jackson's Character Generator ROM.** Ian shows a way to use **Higher Text** fonts to burn in a new ROM for your text screen display. If, for example, Old English is your bag, you could plug in your own character ROM and your regular display would be Old English.

A couple of years ago **Jim Hilger** wrote a first class hi-res **Playing Card Generator** in Integer Basic. Now comes first-timer **Vince Aderente** with an Applesoft update. Here is a real Application you can use to write your own card games with. A demo program is included, so you have all you need to get started.

Concluding this month's cover stories, **Drew Berentes** has spent considerable time in looking over several of the top hi-res utility programs. He reports his findings in **Champagne Graphics (on a Beer Budget).** Put his research to work and choose a drawing (or other) program that will meet your needs.

A couple of other stories are also included in our hi-res feature section: **Donal Buchanan's Confessions of a Computer Junkie** tells how **Higher Text** fonts can be output to a graphics printer, and **Jim Morrissett** ponders if some of the hi-res plot routines are actually too fast for you. **Slow Plot** is a technique to slow 'em down to your pace.

A tutorial we would like to bring to your attention is **Graphic Garbage Collection** by **Richard Cornelius** and **Melvin Zandler,** who have creatively used the hi-res screen to visually demonstrate Applesoft's garbage collection routine at work. As an added bonus, we have re-published a hex dump of **Randy Wigginton's Fast Garbage,** a method of reducing your garbage collection from minutes to seconds.

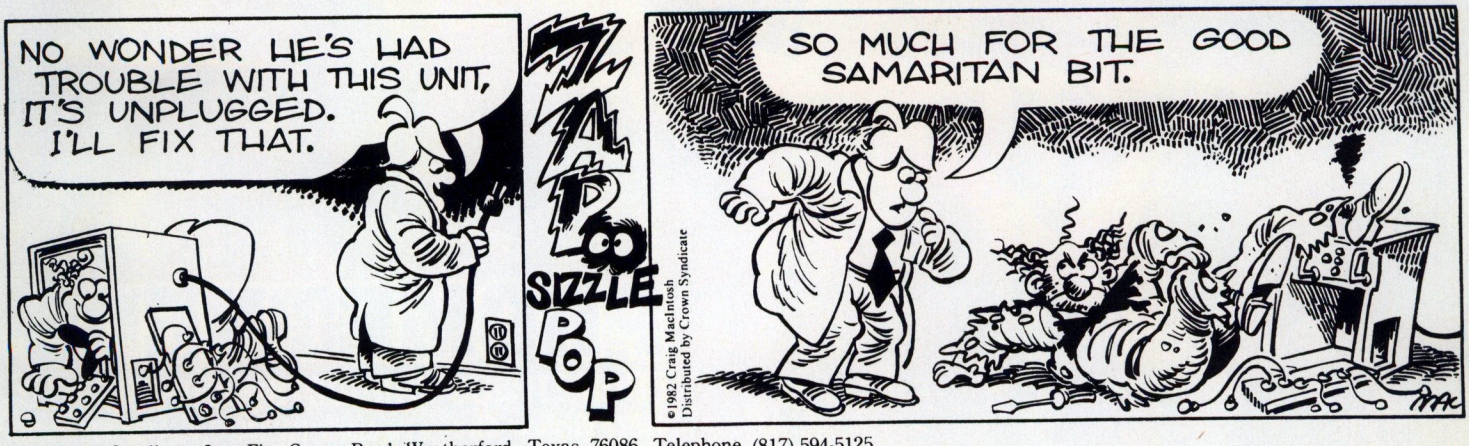
In the same vein, **Clay Ruth** offers **Weeding Out the Trash,** an alternative to garbage collection, as a follow up to his previous article, **Garbagemen Strike** (August, 1982).

From time to time we stress how easy it is to write in assembly language (really). Staff writer **David Sparks** makes it even easier in **To Peacably Assemble,** a multi-purpose tutorial. First he writes a BASIC program which is an inverse to **Big Mac's** UPPER subroutine; this one lets you convert comment lines that commence with * or ; to lower case, leaving the first character capitalized. But that's not all. Next David takes you by the hand into the world of assembly and, line by line, converts the BASIC program into fast running assembly language. Take the easy path; here is your chance!

That's it for this issue. Almost. For shame! You didn't check the contents page? Tsk, tsk. You don't know what you're missing!

# BOOT

Craig MacIntosh

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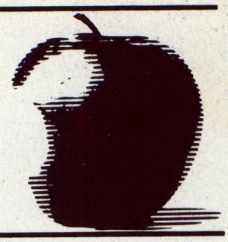


Val J. Golding

BEAR with us. We have had such an overwhelming response from our recent membership mailing we literally had a 12 foot snow bank blocking the entrance to our order processing and shipping departments. As of this writing, we are running about 30 days behind on order turn-around. We have added additional staff to handle the "OVERFLOW ERROR" condition and hope to have things back to normal within the next ten days to two weeks.

Our big "pitch" this issue is *All About Pascal,* which after more than a year in preparation, has finally seen print. This is, of course, issue number two of *Call –A.P.P.L.E. in Depth,* our optional companion magazine. We fully expect *All About Pascal* to create the same stir in the Apple world as did issue number one, *All About Applesoft. All About Pascal* is like its predecessor, a reference work to be perused again and again. For this reason, its 184 pages are printed on durable heavy-duty stock.

The table of contents reads like the Pascal users Christmas wish-list. Editor **Ron DeGroat** has divided the magazine into ten categorized sub-sections such as: *System Utilities, Hardware; Graphics, Software Tools, Information, etc.,* and include features such as a text formatting program, the *Pascal + BASIC System, A P-code Decoder, Disk Directory Structure* and many more items designed to teach you more about Pascal and improve your programming capabilities.

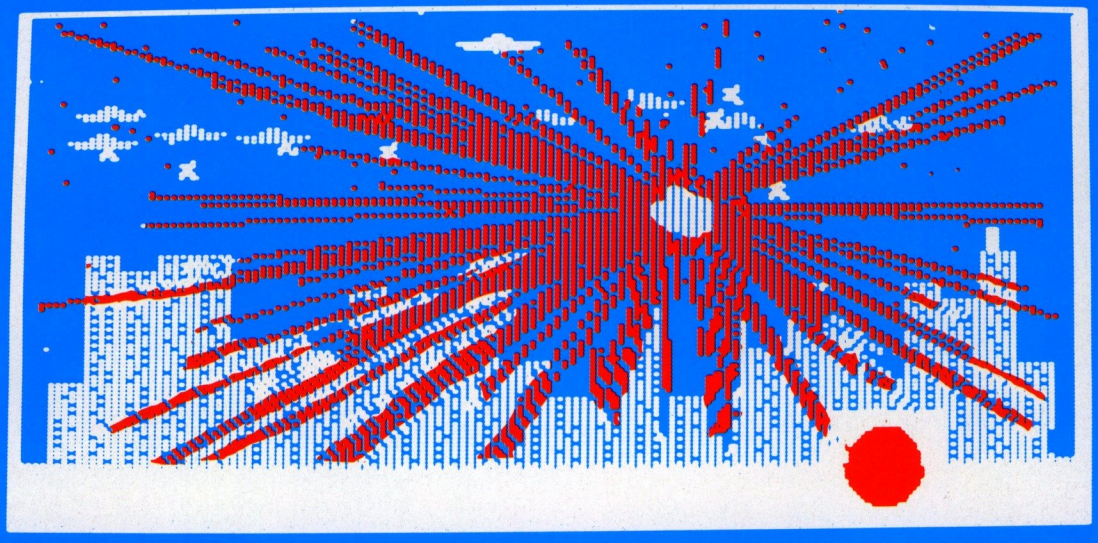
This is ready for shipment now, and those of you who ordered in advance should be receiving your copies at any time. The low member price is just $11.00, plus foreign shipping, if any, and we hope next month to announce an availability date for a two-diskette set to accompany *All About Pascal.*

Coming right (or write) along is issue three of *Call –A.P.P.L.E. In Depth: All About DOS.* Our current planning is to have this ready before the first of the year, but **Don't** order until we know the exact date and price. This will be another huge reference work of about 200 pages with material by all your favorite authors. As with its predecessors, no more than 30% of its content will have appeared in print before.

Still dealing with publications, but on a whole different level, look elsewhere in this issue for our ad offering *Kids and the Apple.* This is a new tutorial for teens and younger who want to learn programming the right way. It is well illustrated and printed in clear, easy-to-read type.

Now take a deep breath and wait for next month — we have a feeling you'll be *really* surprised at some of the new products we'll be able to describe for you.


a city dies whenever nightfalls



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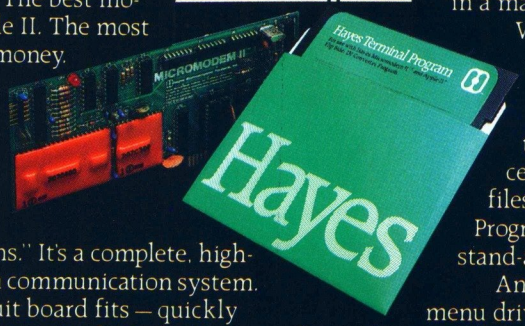


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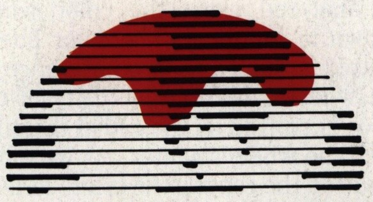
EXPLORING THE WORLD OF APPLE:

# Color Me Apple

M. A. Iannce



IF you, as many others, placed a heavy weight on the Apple's color graphics when you chose it as your personal computer, then you were probably disappointed when you first tried drawing in the Hi-Res mode. Black and white shapes were pretty good, but colored shapes left a lot to be desired.

You must remember that the Apple was designed as a general purpose computer, at a time when memory was relatively expensive. So you should not compare it with the arcade games, which are configured as special purpose graphics computers. Many design compromises were made in fitting the Hi-Res graphics capability into a limited amount of memory. These compromises resulted in a number of "quirks" in the Hi-Res system's operation.

We discovered a number of these quirks while developing the Hi-Res page portion of EZSHAPER, our shape table utility. We discovered them the hard way. We thought we were chasing bugs in our own software, and it was only after hours of checking, that we discovered that the Apple system was a bit "flaky." Our feelings were mixed: pride in having found the answers and frustration in having spent so much time in the search. It seemed these quirks should have been documented somewhere. So we are writing this article to spare others the pride of discovering these quirks themselves.

We found it necessary to understand the basics of color generation on the TV before we could understand the Apple's color generation system. So we will digress here to discuss colors and color TVs before we get to the Apple graphics system.

**. . . TV works on the color additive principle.**

Color TV works on the principle of additive colored light. If you look at the screen of your color TV through a magnifying glass you will see a number of small colored dots or rectangles. Figure 1 shows a typical screen section. Notice that the color patterns repeat across the screen: red, green, blue. Notice, also that vertical columns of dots all have the same color. These dots are so small that three of them seem to combine to a single dot when viewed by the naked eye. We will call each color spot a "pixel." The reader should note that some authors refer to a set of three spots as a "pixel" and Edward So refers to a "pixel" as a block of 64 Apple spots in: "Picture Compression" *Call -A.P.P.L.E.*, May 1982.

Most color TVs generate three electron beams, one for each color, but, to simplify our discussion, we will assume there is only one beam. We assume this beam illuminates each pixel, one at a time. The beam intensity determines the brightness of the spot, the higher the voltage the brighter the glow. The TV sweeps the beam across the screen horizontally drawing the familiar raster lines. It starts drawing these lines at the top of the screen and works down. The circuitry's ability to illuminate a single spot is determined by its bandpass: the higher the bandpass the smaller the spot it can draw and hence the finer the detail.

```
]LIST

10  REM

EUGENE F LOCKE : CALL -A.P.P.L.E.


12  HOME
15  FOR E = 1 TO 36 STEP 2
20  HGR2
23 A = 0
24 D = 0
25  HPLOT 140,90
30  FOR D = 0 TO 3600 STEP E
50 A = A + 1.8
60 X = 140 + A *  SIN (D)
70 Y = 90 + A *  COS (D)
75  IF X > 279 OR X < 1 OR Y > 17
     9 OR Y < 1 THEN 100
80  HPLOT  TO X,Y
90  NEXT D
100  NEXT E
110  GOTO 12
```

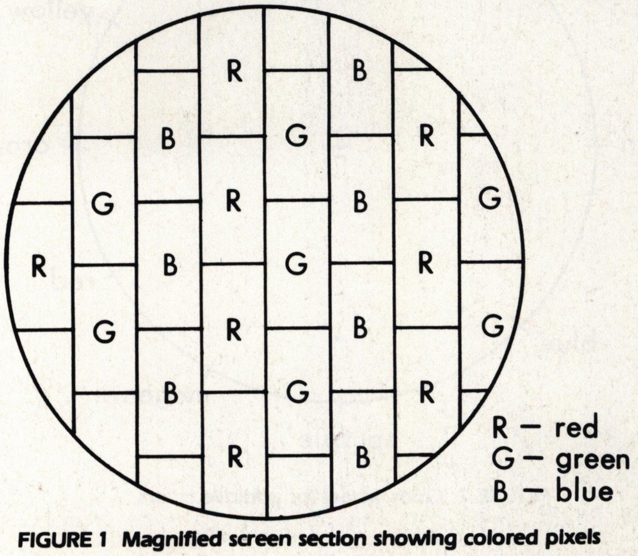



**FIGURE 1 Magnified screen section showing colored pixels**

# COLOR ME APPLE

Since three pixels appear as a single spot, their apparent color can be analyzed using the color wheel shown in Figure 2. The color hue is plotted around the circumference of the wheel, while the intensity of the color is plotted as the radial distance from the wheel's center. As we move towards the center, the colors fade to white. In a color TV, the intensity of each pixel can be set individually. The apparent color is found at the center of the color triangle as shown in Figure 3. This allows color mixing, and since the TV uses an analog signal, there are an infinite number of colors available. However, color computers only have a limited set of intensities; the Apple has only two: on or off. As we will discuss later, color mixing is still possible, but it must be mechanized through software.

**. . . color mixing on the Apple must be mechanized through software**

It is difficult to discuss the subject of color in a black and white magazine, so we have provided a program which demonstrates the quirks. You may wish to load the program and run it before continuing. The format of the remainder of this article will consist of a description of a program DEMO followed by an analysis of the quirks which it illustrates, explaining how they occur.

*DEMO 1: Adjustment of the TV controls. This demo presents five color blocks across the bottom of the screen. The labels under these blocks may not agree with the colors on your set. Try to adjust your set to match the labels. If you can't, then enter the program at line 400 and change the labels to match your set.*

The TV circuitry relies on us to tell it where the color pixels are on the screen. We do this with the HUE or TINT control. As we adjust this control, we shift the beam horizontally in the screen. This effectively rotates the primary colors around the color wheel.

The TV adds two signals to form the beam level: one for B/W and the other for color. The B/W signal is about three pixels wide; the color signal is about one pixel wide. The color knob on your set adjusts the color signal level. As you move it one way the colors fade; move it the other way and they become more intense. Note that the intensity of all color pixels is affected equally by this control.

Two other controls affect the color of your picture. The brightness control raises and lowers the level of both the color and B/W signals. The contrast control changes the range of the B/W signal. In summary, three controls (COLOR, CONTRAST and BRIGHTNESS) change signal voltage levels, while the TINT control changes only beam position.

Now we are ready to describe the Apple's color system. It is common knowledge that the Apple uses bit mapping in its Hi-Res system. This means that most of the Hi-Res buffer bits correspond to spots on the screen. It is less well known that each "Apple spot" is one and one half pixels wide. This explains a number of the Apple's idiosyncrasies.

**. . . each "Applespot" is 1½ pixels wide.**

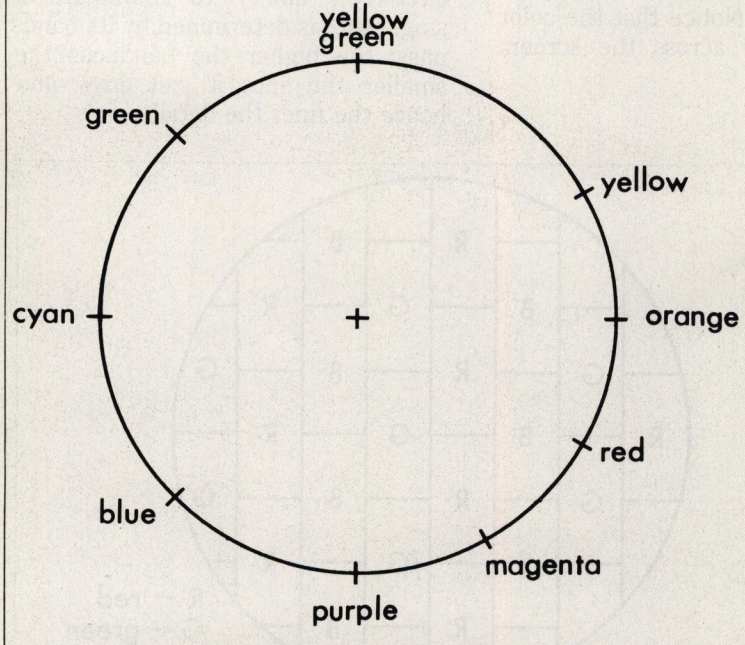



**FIGURE 2 Color wheel for additive colors**

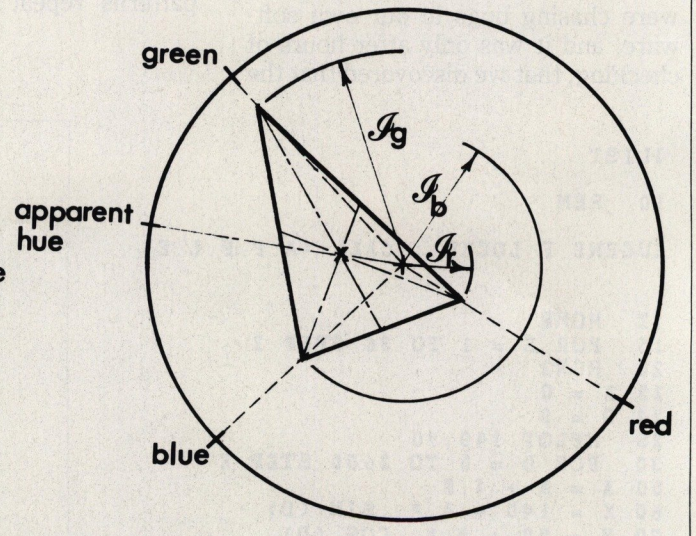



**FIGURE 3 When colors are combined the apparent hue and intensity are at the center of the color triangle**

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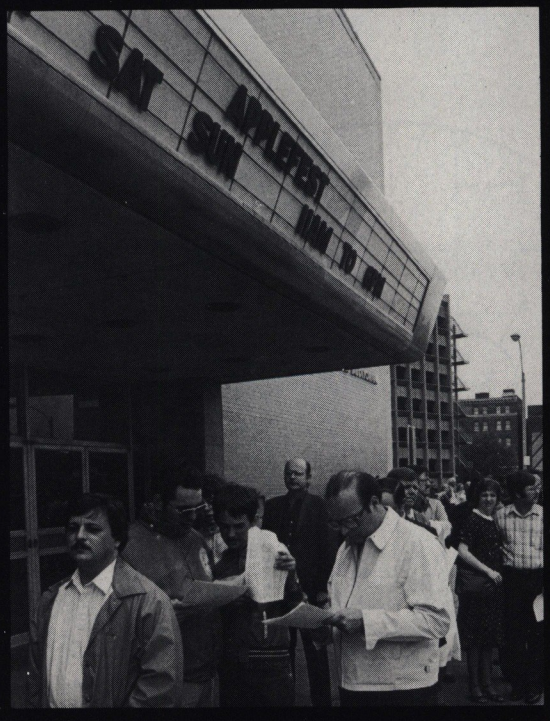


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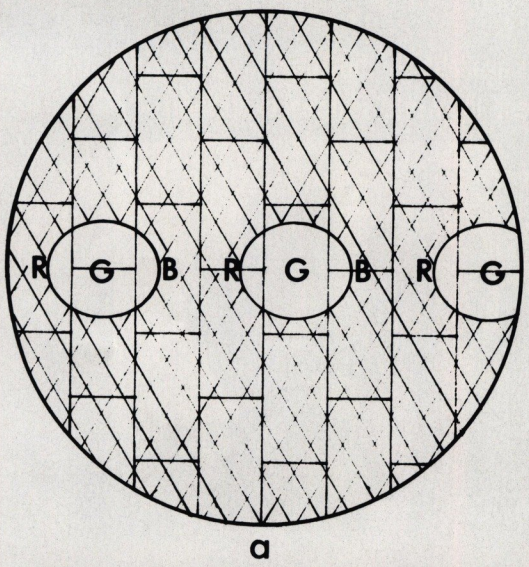
# COLOR ME APPLE

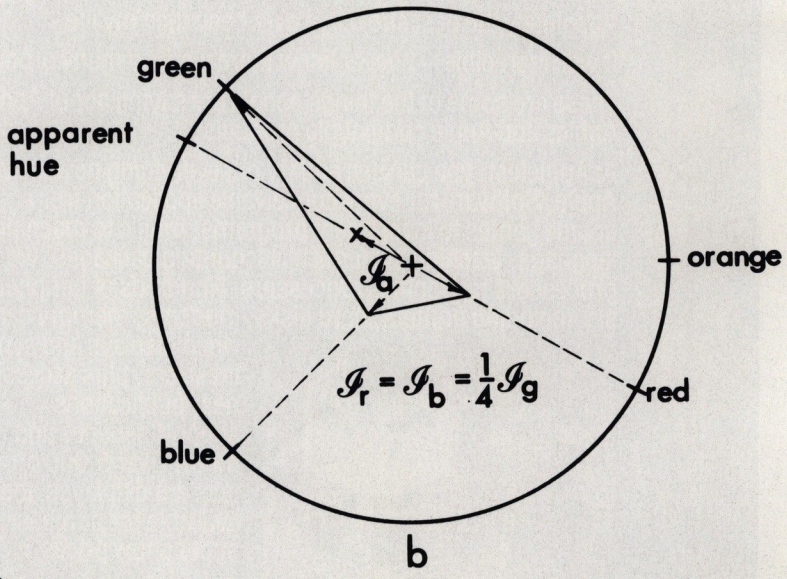
In Figure 4a we show the effect of lighting every other "Apple spot". This illuminates a GREEN pixel and a quarter pixel each of RED and BLUE. Figure 4b shows that this combination, which repeats across the screen, gives a pale green. In Figure 5a we see that lighting the other 'Apple spots" results in ¾ pixel each of RED and BLUE. Figure 5b shows that these combine to form violet.

Not all of the screen buffer bits correspond to spots. Bit 7 of each word is a "color-shift-bit" (CSB). When the Apple's video-generation-circuits sense the CSB is set, they automatically shift the screen spots for that buffer word one half of an "Apple spot" (3/4 pixel) to the left. Figure 6a shows the situation of 4a with the CSB set. We see this results in a RED pixel and half a pixel of GREEN. Figure 6b shows that this combination gives a redish orange. Figure 7a shows the situation of 5b with the CSB set. This lights a BLUE pixel and half a GREEN pixel. Figure 7b shows that this combination yields a light greenish blue.



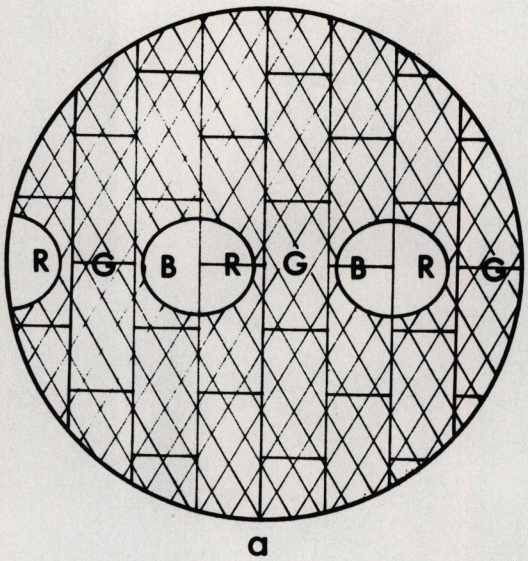

a

FIGURE 4(a) Illuminating every other Apple spot yields the color green



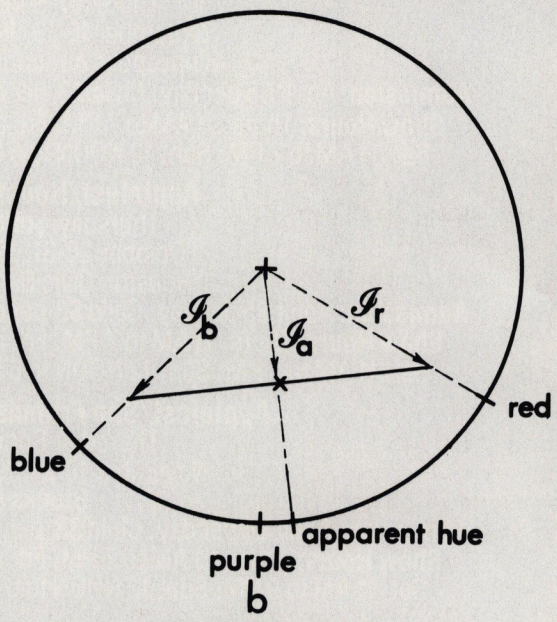

b

FIGURE 4(b)




a

FIGURE 5(a) the other Apple spots make violet




b

FIGURE 5(b)

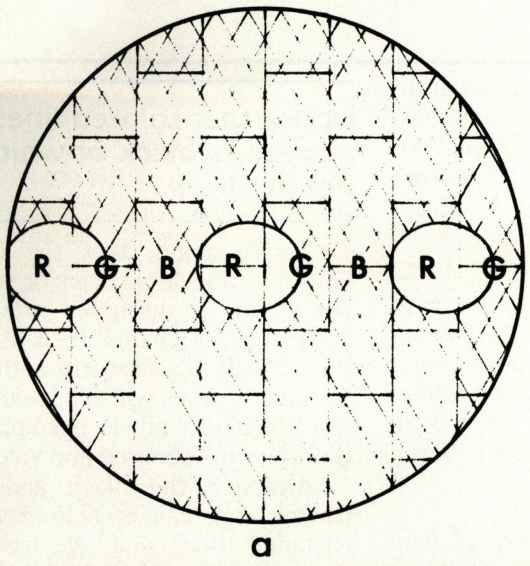



FIGURE 6(a) The Apple spots of Figure 4 make reddish orange with the CSB set

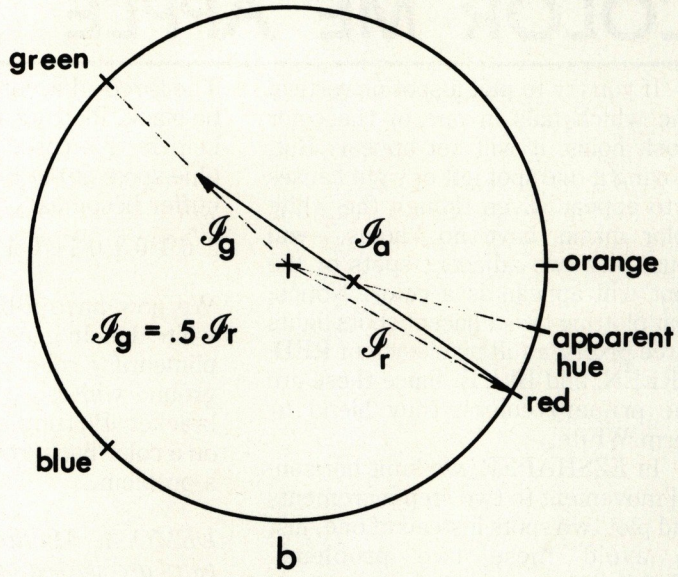



FIGURE 6(b)

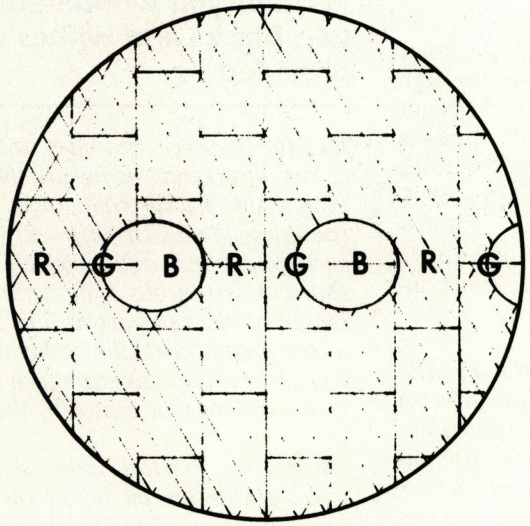



FIGURE 7(a) Setting the CSB with Apple spots of Figure 5 makes light blue

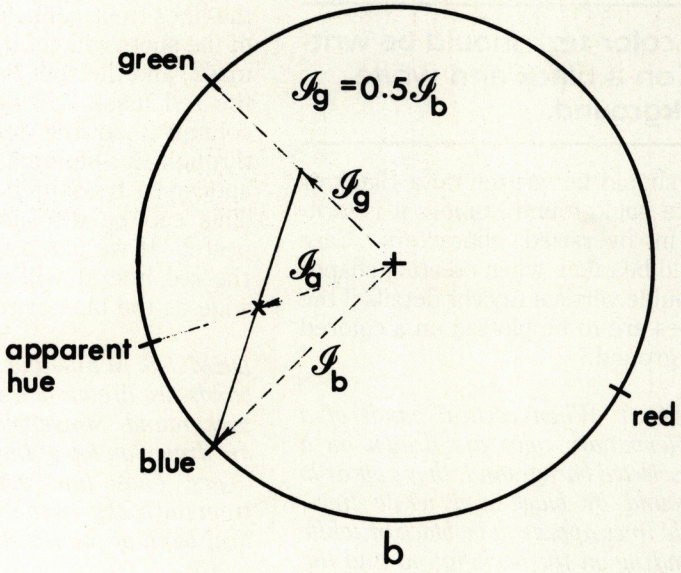



FIGURE 7(b)

*DEMO 2: On the left side of the screen, vertical lines are plotted in the even columns. On the right side, they are drawn in the odd columns. Vertical lines which appear in even columns, do not appear in the odd columns and vice versa.*

Each HCOLOR has a corresponding color mask ($E4), as shown in the table below. This mask is used by Applesoft to decide whether or not to plot a spot you have HPLOTed (it is not used by XDRAW). Since the buffer words only use 7 bits, the color mask must be inverted for every other screen word or else the word and spots would break the pattern. Applesoft uses an on-the-fly color mask ($1C) when it does the actual plotting.

| HCOLOR | MASK BIT PATTERN | HEX VALUE |
|---|---|---|
| 0.BLACK | 00000000 | 00 |
| 1.GREEN | 01010101 | 55 |
| 2.VIOLET | 00101010 | 2A |
| 3.WHITE | 01111111 | 7F |
| 4.BLACK | 10000000 | 80 |
| 5.RED | 11010101 | D5 |
| 6.BLUE | 10101010 | AA |
| 7.WHITE | 11111111 | FF |

If you try to plot a spot or vertical line which fails in one of the color mask holes, it will not appear. But, moving it one spot left or right causes it to appear. Even though the white color masks have no "holes," you must plot two adjacent spots or the spot will appear as a color. Notice, that plotting two adjacent spots lights three pixels; a full pixel each of RED, GREEN, and BLUE. Since these are the primary colors, they blend to form White.

In EZSHAPER, we limit horizontal movement to two step increments and plot two spots instead of one, just to avoid these two problems. Machine language programmers get an extra benefit from this strategy, the range of horizontal movement is 0–139 instead of 0–299. This requires only one byte instead of two and reduces logic requirements considerably.

The double spot strategy does not help when plotting text or shapes. So

**. . . color text should be written on a black and white background.**

text should be written on a Black or White background., unless it is written in oversized characters. Care should be taken when creating shapes to double vertical rays or details if the shapes are to be plotted on a colored background.

*DEMO 3. When vertical bands of a complementary color are drawn on a user selected background, they appear to be bound by black and white lines. Single lines appear to be black or white depending on the background and the column in which they are plotted.*

Applesoft's use of spot position to generate color, results in a number of quirks. For instance, suppose we are plotting on a red (5) screen. Then, ignoring the CSB, a section of the screen buffer would look like this:

1 0 1 0 1 0 1 : 0 1 0 1 0 1 0

If we plot a blue spot at the twelfth location, the buffer would become:

1 0 1 0 1 0 1 : 0 1 0 1 1 1 0

The three adjacent zeros will seem to be black. Plotting a spot pair does not help in this case. If we plotted two blue spots at the twelfth location, the buffer becomes:

1 0 1 0 1 0 1 : 0 1 0 1 1 0 0

We now have a black dot next to a white dot. In general, plotting a complimentary color on a colored background will cause a black and white bracket. Plotting black or white dots on a color background does not cause a problem.

*DEMO 4. Multicolored vertical line pairs are stacked on top of each other. The line pairs seem to shift horizontally with color.*

The positional color system causes another strange behavior. Suppose we plot a red vertical line above a blue vertical line, using the spot-pair-strategy. We would expect the lines to be colinear. But, only one of the spots will get through the color mask, and the spot that gets through the red mask will be in a different column than the spot that passes through the blue mask. So the lines appear to be shifted on the screen. This can be disconcerting if unexpected. If we plot a white line above the red line, it will appear twice as wide as the blue or red line.

*DEMO 5. White and black horizontal bands are drawn across a user selected background. Single width vertical lines are drawn on top of these with different colors. Those lines whose CSB differs from the background's CSB cause a vertical band of color instead of a line.*

As we have noted, the CSB causes all seven screen bits to be shifted. Suppose the screen color is set to green (1). All CSBs in the screen buffer are clear. If we plot any HCOLOR 4–6, it will set the CSB. This causes seven green spots to shift, turning them into red spots. If the background is red (5), the HCOLORs 0-3 will cause green bands. A similar effect occurs with the blue/violet pair. Notice that shifting a black or white background word does not change its color. That is why these are preferred background colors.

**Notice that colored lines may appear as black or white or not at all . . .**

Notice again, that the colored lines may appear as black or white or not at all, as discussed previously. This does not change their effect on the CSB. It is also worth noting that the colored lines which appear on the black background do not appear on the white background and vice versa.

Although the black and white backgrounds can be shifted without changing their color, we have seen that you must be careful to choose the HCOLOR whose CSB agrees with the background. Perhaps you wondered, as we did, why two blacks and whites were provided; it's to keep the CSB from changing the background color.

**Perhaps you wondered why two blacks and whites were provided . . .**

*DEMO 6. Seven triangles are plotted across the screen using all the colors except the background color. Those triangles with a CSB different than the background have a stair step effect. The stairs are seven bits wide, with a color that obeys the rules above. The triangle which complements the background has a black or white stair step much less pronounced than that caused by the CSB.*

*DEMO 7. Vertical lines, seven bits wide, are drawn on top of each other with differing colors. The lines seem to be of different width.*

To avoid the CSB problems, while still allowing all colors in EZ-SHAPER's Hi-Res page mode, we provided a partial move mode. This is similar to the Lo-Res mode in that each spot is seven bits wide (a full buffer word) this is why the Lo-Res mode can have 16 colors. The line width depends on color because of the color mask. If seven spots are plotted with a color, then at most four spots will appear. If four spots do appear, then only three spots of its

complement will appear, making it seem narrower. Any odd number of words will have this same effect, although the more words you plot the less noticable this effect becomes. Plot an even number of words horizontally and all colors will have the same line width.

*DEMO 8. Colored boxes are drawn along the right screen edge, on top of a user selected background color. Under certain circumstances a ghost of this spot will appear on the left edge of the screen.*

This last quirk is worth noting, although we believe it should really be classified a a bug in the Apple video interface hardware. The CSB of the background must be set (4–7) and the color must cause a spot to appear in column 279. This effect is most noticable with the black background (4). With a colored background the ghosts appear as black lines and are hard to distinguish from the black border. The ghost spot shifts vertically to the screen position of the next screen buffer word. Since some screen buffers words are not displayed, some spots will not have a ghost. This effect is especially noticable when you plot vertical lines on the screen edge as in the demo.

*DEMO 9. The user inputs two colors. Grids with these two colors are superimposed forming a block of a third color. If the colors are complementary, the resulting color will be white.*

At the beginning of this article we stated that colors could be blended under software control. Although the concept is quite simple, the mechanization is usually rather tedious. Technically, this trick is referred to as interleaving, it involves drawing one picture in the cracks of another.

## The image on your TV is the result of interleaving two images . . .

The image on your TV set is the result of interleaving two images, each with 226 raster lines. The basic idea is that we can plot different colored horizontal lines one above the other with no problem (all of the problems we have discussed involved vertical lines). The colors of these lines will seem to blend to form a new color. To use this concept with shapes you must have two shape tables of the same shape. These shapes must have every other horizontal row blanked out, in such a way, that they will form the desired shape when superimposed. If you own a shape drawing utility like EZSHAPER, which has logical shape functions (AND and EOR), this is a fairly easy task. Plot the two shapes at the same position with different colors to give the shape a third color. Different blendings can be made with different interleaving strategies. For instance, you could use two lines and a blank superimposed on one line and two blanks. Use the color wheel to anticipate the resulting colors.

### Conclusion

In summary, we suggest the following tips for better graphics:

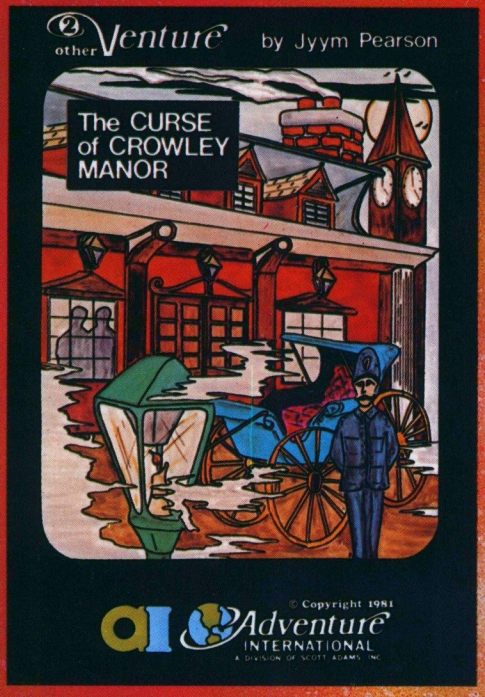
1. Draw on a black background if possible
2. A white background is the second choice
3. Use XDRAW as a first choice for colored backgrounds
4. Restrict color choices to black, white and complement when drawing on colored background.
5. Double vertical rays and details in shapes
6. Make your spots double wide
7. Avoid the rightmost screen column
8. Beware of the CSB, its sting is painful

We hope this article will be of help to you in creating better graphics on your Apple. We feel that the graphics area is one of the most satisfying uses of the home computer and that its potential is just being scratched.

```
]LIST

0   REM

     COLOR ME APPLE DEMO

CALL -A.P.P.L.E. : NOV. 1982

1   LOMEM: 16384
2   GOTO 100
3   REM  SUBROUTINES
4   PRINT : VTAB 24: HTAB 9: PRINT
      "(ANY KEY TO CONTINUE)";: GET
      X$: PRINT : RETURN
5   PRINT "COLOR (0-7)? ";: GET X$
      :C =  VAL (X$): IF C > 7 THEN
       PRINT X$G$: GOTO 5
6   PRINT HC$(C)C$(C > 3): HCOLOR=
      C: RETURN
7   VTAB 21: PRINT "BACKGROUND ";:
       GOSUB 5: HGR : HPLOT 0,0: CALL
      62454:BC = C: RETURN
8   PRINT " EVEN COLUMNS";: HTAB 2
      7: PRINT "ODD COLUMNS": RETURN

9   HCOLOR= 3: HPLOT 96,Y TO 103,Y
      : HPLOT 99,Y - 3 TO 99,Y + 3
      : HPLOT 100,Y - 3 TO 100,Y +
      3: HPLOT 177,Y - 1 TO 183,Y -
      1: HPLOT 177,Y + 1 TO 183,Y +
      1: RETURN
10  HCOLOR= C: HPLOT 40,Y TO 80,Y
      : HPLOT 40,Y + 1 TO 80,Y + 1
      : HPLOT 200,Y TO 240,Y: HPLOT
      200,Y + 1 TO 240,Y + 1
15  HCOLOR= C1: HPLOT 120,Y + 2 TO
      160,Y + 2: HPLOT 200,Y + 2 TO
      240,Y + 2: RETURN
100 REM
110 REM    COMMAND MENU
120 REM
140 HOME : VTAB 8: POKE 32,8: HTAB
      15: PRINT "COMMANDS": HTAB 7
      : PRINT "--------": PRINT
160 PRINT "->" TAB( 9)"NEXT DEMO
      ": PRINT "<-" TAB( 9)"PREVIO
      US DEMO"
180 PRINT "RTN" TAB( 9)"REPEAT D
      EMO": PRINT "ESC" TAB( 9)"DE
      MO LIST": POKE 32,0: GOSUB 4

200 REM
205 REM INITIALIZATION
210 REM
220 FOR I = 1 TO 40:L$ = L$ + "-
      ": NEXT
240 G$ =  CHR$ (7)
260 FOR I = 0 TO 8: READ T$(I): NEXT
```

# OTHER WORLDS. OTHER REALITIES.

## (FOR EXPERIENCED ADVENTURERS ONLY!)

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*by Jyym Pearson*

You've sensed it before: nameless, unreasoning fear. Fear of the unseen — of things that scurry and scrabble through the shadows when the lights have been put out. How then will you fare when you face the Ultimate Evil; how will you possibly survive — THE CURSE OF CROWLEY MANOR?

Now, another giant leap forward for Adventure lovers everywhere — full color, hi-res graphics! That's right, author Jyym Pearson's masterpiece of the macabre explores a new dimension in fright with the incredible wallop of quality graphics — the kind you bought your APPLE for. THE CURSE OF CROWLEY MANOR is an excursion into mind-wrenching terror as you enter the dreaded Crowley Estate in search of answers to some pretty grisly questions. Fear fans take note: This is the stuff that nightmares are made of, so think twice before you approach . . .

THE CURSE OF CROWLEY MANOR features Adventuring the way YOU like it, with plenty of vibrant graphics, clever plot twists, and a scenario that'll roll your socks up and down your legs! If Adventuring has become a bit tame for you lately, this is one sure-fire cure! THE CURSE OF CROWLEY MANOR will run on any APPLE 2 with 48K of memory, Applesoft in ROM and a disk drive. We supply the software, you supply the atmosphere. (A well-lit room is optional, but recommended!)

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### LABYRINTH OF CRETE

*by Cliff Johnson and Allen Pinero*

An Adventure of truly epic proportions, LABYRINTH OF CRETE paves the way for an entirely new form of Adventuring — you control the actions of TWO separate characters! That's right, the player is in complete control of two powerful warriors, the stalwart Jason, and the might-thewed Hercules. Straight from the mythology of ancient Greece they come, and their quest is a most dangerous one, indeed — the recovery of the mythical Golden Fleece from the heart of the horrific Labyrinth! But have a care, O rash one; the designer of the maze, Minos of Daedalus, crafted well the nefarious network. Evil most foul abounds within its walls, including all manner of traps, tricks and a gruesome parade of maze inhabitants. Many have tried, and many have failed to penetrate and exit the Labyrinth — will you be able to direct Jason and Hercules to success?

If you're ready for a new era in Adventuring, LABYRINTH OF CRETE is just what the leech ordered! Featuring full color, hi-res graphics that depict your trek into terror, you'll be amazed at the authors' slavish devotion to the spirit of the timeless Greek characters and situations.

LABYRINTH OF CRETE comes with a detailed instruction manual that will add to your enjoyment of this unique form of Adventuring entertainment, and will operate on any APPLE 2 computer with one disk drive and 48K of memory.

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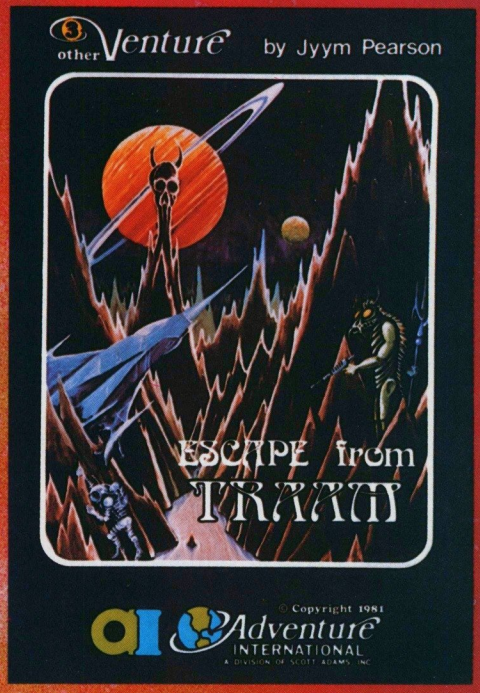


### ESCAPE FROM TRAAM

*by Jyym Pearson*

You've managed to survive the Curse of Crowley Manor and negotiate the awesome Labyrinth of Crete — but will even your finely tuned Adventuring skills give you the necessary edge to . . . ESCAPE FROM TRAAM?

As soon as your small space crusier began losing altitude, you knew you were in for serious trouble. You somehow walked away from a fiery landing that would've spelled certain death for a less fortunate man, but as you are about to learn, there are fates worse than a quick death . .

ESCAPE FROM TRAAM is a detailed, hi-res Adventure for the APPLE computer that defies the player to successfully search a bizarre alien world for a means of escape. The perils are many and the opportunities for survival are few. But for the clever Adventurer, a single opportunity is all that might be needed for a speedy exit from this hellish world. Are you up to the challenge?

All of the traditional Adventure elements are in ESCAPE FROM TRAAM, including two-world command input, game save feature, and an extensive vocabulary. Add to this the impact of colorful hi-res graphics that will allow the story to spring to vibrant, scintillating life, and you'll know that ESCAPE FROM TRAAM will be a fine addition to any graphic Adventure collection.

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# COLOR ME APPLE

```
280  DATA "COLOR ADJUSTMENT.","CO
     LOR MASK HOLES.","WHEN COLOR
      = BLACK/WHITE.","POSITION &
      SIZE EFFECTS.","PROBLEMS WI
     TH THE CSB.","SHAPES AND THE
      CSB.","SEVEN BIT LINES."
300  DATA "SCREEN EDGE EFFECTS.",
     "A MORE COLORFUL APPLE"
320  FOR I = 0 TO 7: READ HC$(I):
      NEXT
340  DATA   "BLACK","GREEN","VIOL
     ET","WHITE"
360  DATA   "BLACK","RED","BLUE",
     "WHITE"
380 C$(1) = " (CSB SET)"
400  REM
410  REM  TABLE OF CONTENTS
415  REM
420  HOME : VTAB 6
440  HTAB 11: PRINT "TABLE OF CON
     TENTS"
460  HTAB 11: PRINT  LEFT$ (L$,17
     ): PRINT : PRINT
480  PRINT "DEMO" SPC( 4)"TOPIC":
      PRINT
500  FOR I = 1 TO 9: PRINT I"." SPC(
     6)T$(I - 1): NEXT
520  VTAB 21: PRINT : PRINT "DEMO
      NO.? ";: GET X$:N =  VAL (X
     $): IF  NOT N THEN  PRINT X$
     G$: GOTO 520
540  REM
545  REM  SELECT DEMO
550  REM
560  HOME : PRINT L$: PRINT "DEMO
      NO. "N" -- "T$(N - 1): PRINT
     : PRINT L$: VTAB 8
580  ON N GOSUB 1000,2000,3000,40
     00,5000,6000,7000,8000,9000
600  REM
620  REM  COMMAND PROCESSING
640  REM
660  VTAB 24: PRINT ".... -> ....
      ESC .... RTN.... <- ....";:
      GET X$:X =  ASC (X$): TEXT

680  IF X = 27 THEN 400
700  IF  NOT (X = 8 OR X = 13 OR
     X = 21) THEN  PRINT G$;: HTAB
     1: GOTO 660
720 N = N + (X = 21) - (X = 8)
740  IF N < 1 OR N > 9 THEN N = 1

760  GOTO 560
1000  REM
1020  REM  DEMO 1: COLOR ADJUST
1040  REM
1060  PRINT "THIS DEMO ALLOWS YOU
      TO ADJUST THE COLOR";
1065  PRINT "CONTROLS ON YOUR SET
     , AND TO EXPERIMENT"
1070  PRINT "WITH THEM.": PRINT
1080  PRINT "THE CONTROLS ARE: TI
     NT"
1100  HTAB 19: PRINT "COLOR"
1120  HTAB 19: PRINT "CONTRAST"
1140  HTAB 19: PRINT "BRIGHTNESS"

1160  GOSUB 4
1180  HGR : HOME : VTAB 21:X = 0:
     H = 1
1200  FOR C = 1 TO 6: IF C = 4 THEN
     1280
1220  HCOLOR= C: FOR Y = 130 TO 1
     60: HPLOT X,Y TO X + 35,Y: NEXT
1240  HTAB H: PRINT HC$(C);
1260 X = X + 56:H = H + 8
1280  NEXT : PRINT
1300  RETURN
2000  REM
2020  REM  DEMO 2: COLOR MASK HOL
     ES
2040  REM
2060  PRINT "THIS DEMO SHOWS THAT
      SPOTS PLOTTED IN"
2065  PRINT "THE COLOR MASK HOLES
      DO NOT APPEAR."
2070  PRINT "IT CONSISTS OF PLOTT
     ING THE SAME FIGURE"
2075  PRINT "ACROSS THE SCREEN, W
     ITH VARYING COLORS."
2080  GOSUB 4: HGR
2140  HOME : VTAB 22:X = 0:H = 2:
      GOSUB 8: VTAB 21: HTAB 18: PRINT
     "COLOR";
2180  FOR IX = 0 TO 1: FOR C = 1 TO
     6: IF C = 3 OR C = 4 THEN 23
     00
2200  HCOLOR= C: FOR Y = 0 TO 30:
      HPLOT X,Y TO X + 20,Y: NEXT

2220  FOR Y = 130 TO 160: HPLOT X
     ,Y TO X + 20,Y: NEXT
2240  FOR X = X TO X + 20 STEP 4:
      HPLOT X,30 TO X,130: NEXT
2260  HTAB H: PRINT C;
2280 X = X + 4:H = H + 4
2300  NEXT C:X = 169:H = 26: NEXT

2320  PRINT : RETURN
3000  REM
3020  REM  DEMO 3: B/W BANDS
3040  REM
3060  PRINT "THIS DEMONSTRATES TH
     AT VERTICAL LINES,"
3080  PRINT "ONE BLACK & ONE WHIT
     E, WILL APPEAR WHEN"
3100  PRINT "YOU PLOT A COLORED F
     IGURE ON ITS COMPLE-";
3120  PRINT "MENT.  THE DEMO CONS
     ISTS OF VERTICAL"
3140  PRINT "BANDS OF VARYING WID
     TH."
3160  PRINT : PRINT "DO NOT USE A
      BLACK OR WHITE BACKGROUND!"

3180  GOSUB 7
3200 C = C + 1: IF C = 3 OR C = 7
      THEN C = C - 2
3220 K = 1:H = 1: HCOLOR= C: HOME
     : VTAB 21
3240  FOR I = 6 TO 90 STEP 20
3260  FOR X = I TO I + K - 1: HPLOT
     X,20 TO X,140: HPLOT 279 - X
      - (I > 6),20 TO 279 - X - (
     I > 6),140: NEXT
3280  HTAB H: PRINT K;: HTAB 40 -
     H - (K = 16): PRINT K;:K = 2
      * K:H = H + 3
3300  NEXT : PRINT : GOTO 8
4000  REM
4020  REM  DEMO 4: POSITION & SIZ
     E
4040  REM
4060  PRINT "IN THIS DEMO TWO ADJ
     ACENT VERTICAL LINES";
4080  PRINT "ARE DRAWN. THE CHANG
     ING COLOR MAKES THEM";
4100  PRINT "SEEM TO BE OFFSET."
4140  GOSUB 4
```

```
4160 Y = 0
4180  HGR : FOR C = 1 TO 6: IF C =
     4 THEN C = 5
4200  HCOLOR= C
4220  FOR X = 140 TO 141: HPLOT X
     ,Y TO X,Y + 31: NEXT
4240 Y = Y + 32: NEXT
4300  HOME : RETURN
5000  REM
5020  REM  DEMO 5: CSB QUIRKS
5040  REM
5060  PRINT "THIS IS A DEMONSTRAT
     ION OF PROBLEMS WITH";
5100  PRINT "THE CSB. VERTICAL LI
     NES ONE SPOT WIDE"
5120  PRINT "ARE PLOTTED WITH VAR
     YING COLORS."
5160  GOSUB 7
5200  HCOLOR= 0: FOR Y = 120 TO 1
     40: HPLOT 0,Y TO 279,Y: NEXT

5220  HCOLOR= 3: FOR Y = Y TO 160
     : HPLOT 0,Y TO 279,Y: NEXT
5240 X = 6:H = 1: HOME : VTAB 21:
      FOR C = 0 TO 7: IF C = BC THEN
     5300
5260  HCOLOR= C: HPLOT X,0 TO X,1
     60: HPLOT 181 + X,0 TO 181 +
     X,160
5280  HTAB H: PRINT C;: HTAB 26 +
     H: PRINT C;:X = X + 14:H = H
      + 2
5300  NEXT : HTAB 17: PRINT "HCOLOR"
5320  GOTO 8
6000  REM
6020  REM  DEMO 6: CSB SHAPE QUIRKS
```


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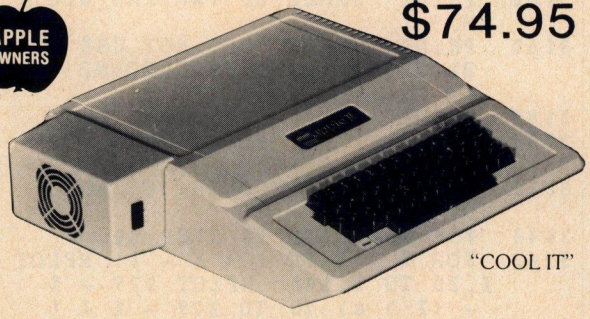

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```
6040  REM
6060  PRINT "THIS DEMO SHOWS THE
     EFFECT OF THE CSB"
6080  PRINT "WHEN PLOTTING SHAPES
     "
6100  GOSUB 7
6120 X = 0:H = 3: HOME : VTAB 21
6140  FOR C = 0 TO 7: IF C = BC THEN
     6220
6160  HCOLOR= C
6180  FOR I = 0 TO 27: HPLOT X +
     I,150 TO X + I,150 - I: NEXT

6200 X = X + 42: HTAB H: PRINT C;
     :H = H + 6
6220  NEXT
6240  VTAB 22: HTAB 17: PRINT "HC
     OLOR"
6300  RETURN
7000  REM
7020  REM  DEMO 7: 7 BIT LINES
7040  REM
7060  PRINT "SHOWS THAT 7 BIT WID
     E LINES CHANGE"
7080  PRINT "WIDTH WITH COLOR."
7100  GOSUB 4
7120  HGR :Y = 0:X1 = 56:X2 = 217

7140  FOR C = 1 TO 6:C = C + (C =
     4)
7160  HCOLOR= C
7180  FOR I = 0 TO 6: HPLOT X1 +
     I,Y TO X1 + I,Y + 32: HPLOT
     X2 + I,Y TO X2 + I,Y + 32: NEXT

7200 Y = Y + 33: NEXT
7220  HOME : VTAB 21: GOTO 8
8000  REM
8020  REM  DEMO 8: SCREEN EDGE
8030  REM
8040  PRINT "DEMONSTRATION OF 'GH
     OST' SPOTS CAUSED"
8060  PRINT "BY THE CSB"
8080  GOSUB 7
8100 Y = 15
8120  FOR C = 1 TO 7:C = C + (C =
     BC AND C < 7)
8140  HCOLOR= C
8160  FOR X = 267 TO 279: HPLOT X
     ,Y TO X,Y + 10: NEXT
8180 Y = Y + 12: NEXT
8200  RETURN
9000  REM
9020  REM  DEMO 9: MORE COLORS
9040  REM
9060  PRINT "DEMONSTRATES THE MET
     HOD OF CREATING"
9080  PRINT "MORE THAN 4 COLORS I
     N HI-RES MODE."
9100  VTAB 21: PRINT "FIRST  ";: GOSUB
     5: HGR :C1 = C
9120  PRINT "SECOND ";: GOSUB 5
9140  FOR Y = 20 TO 40 STEP 2
9160  HCOLOR= C1: HPLOT 40,Y TO 8
     0,Y: HPLOT 200,Y TO 240,Y
9180  HCOLOR= C: HPLOT 120,Y + 1 TO
     160,Y + 1: HPLOT 200,Y + 1 TO
     240,Y + 1
9200  NEXT :Y = 30: GOSUB 9
9240  FOR Y = 70 TO 90 STEP 3
9280  GOSUB 10
9300  NEXT :Y = 80: GOSUB 9
9340 CC = C:C = C1:C1 = CC
9360  FOR Y = 120 TO 140 STEP 3
9380  GOSUB 10
9400  NEXT :Y = 130: GOTO 9
```

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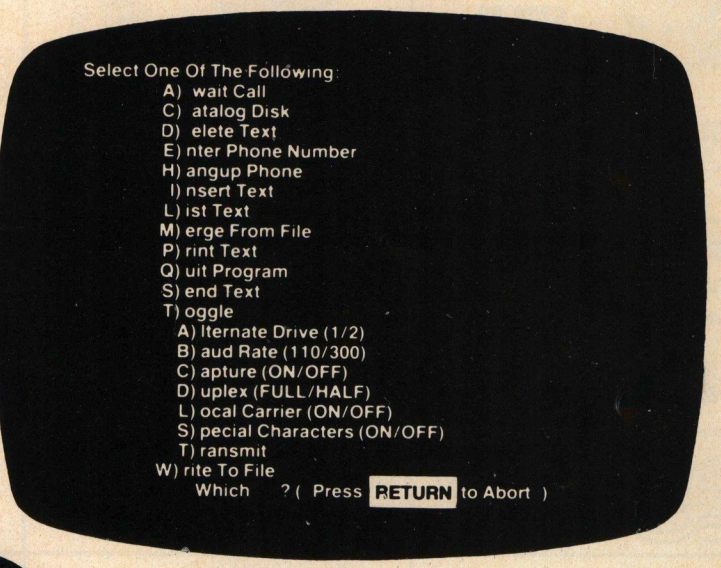


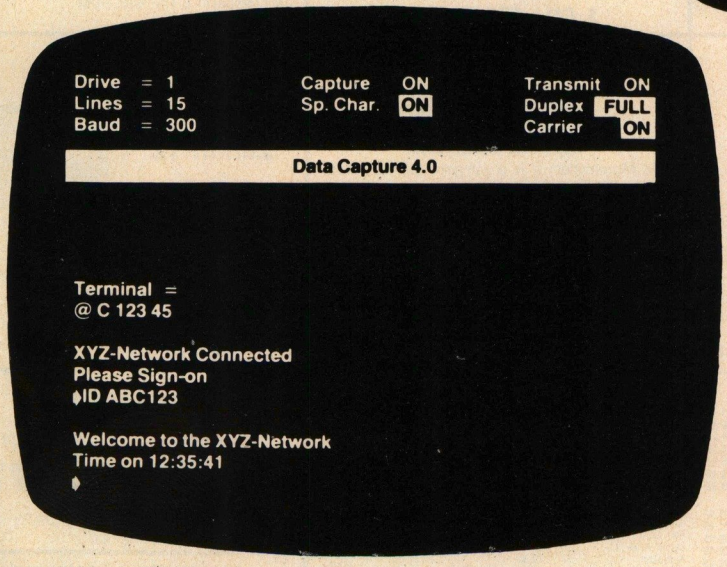


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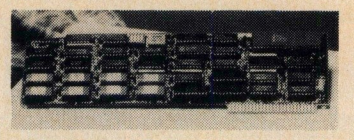

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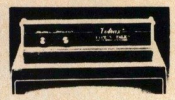

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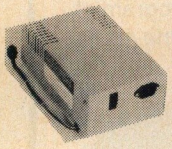

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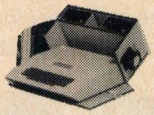

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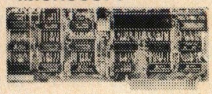

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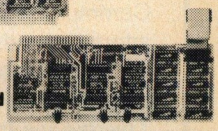

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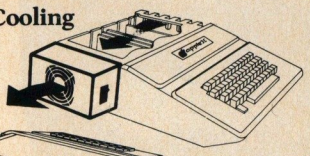

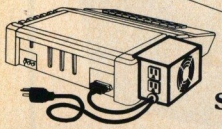

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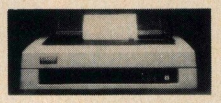

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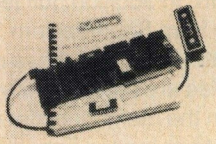

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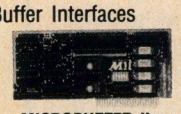

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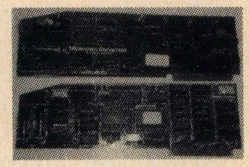

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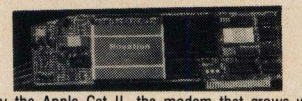

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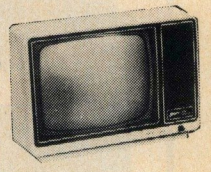

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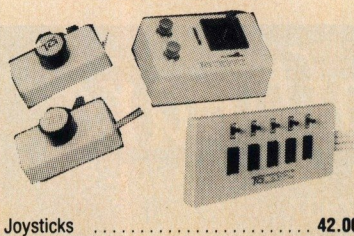

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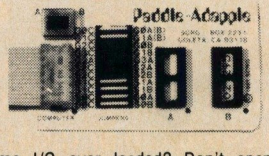


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A HIGHER TEXT APPLE-CATION:

# Character Generator ROM

Ian M. Jackson

I ordered my ROM burner earlier this year. Such was the speed of the overseas mails, and the efficiency of Apparat, that it arrived before the EPROMs I had ordered in New Zealand. When it arrived, the only ROM I had was the old standard Character Generator ROM, which I had replaced with the ApLcase ROM. If I could not burn one right away, at least I could examine one by using the burner socket to download the code from the Character Generator ROM.

Downloading the ROM and choosing the examine memory option gave me.

**0008 - 00 08 14 22 22 3E 22 22**

This does not mean a great deal until you examine the binary form of these Hex numbers.

| HEX | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DATA | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 22 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 22 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 3E | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 22 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 22 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

The pattern is probably easier to see if we use an asterisk to represent the bits that are set, and dots for those not set.

| HEX | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DATA | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 00 | . | . | . | . | . | . | . | . |
| 08 | . | . | . | . | * | . | . | . |
| 14 | . | . | . | * | . | * | . | . |
| 22 | . | . | * | . | . | . | * | . |
| 22 | . | . | * | . | . | . | * | . |
| 3E | . | . | * | * | * | * | * | . |
| 22 | . | . | * | . | . | . | * | . |
| 22 | . | . | * | . | . | . | * | . |

It clearly gives an "A".

The full 64 printing characters (26 letters, 10 numerals and 28 special characters) could be similarly built from the bit patterns of each successive set of eight bytes. At eight bytes per character this gives only 512 bytes, or one quarter the capacity of the 2K Character Generator ROM. More investigation was called for. Examine the 66th set of eight bytes:

**0208 - 80 88 94 A2 A2 BE A2 A2**

Now examine the binary form:

| HEX | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DATA | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 80 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 88 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 94 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| A2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| A2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| BE | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| A2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| A2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

Using an asterisk for the bits that are set, except for the high bit (bit 7), and dots for those not set:

| HEX | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DATA | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 80 | 1 | . | . | . | . | . | . | . |
| 88 | 1 | . | . | . | * | . | . | . |
| 94 | 1 | . | . | * | . | * | . | . |
| A2 | 1 | . | * | . | . | . | * | . |
| A2 | 1 | . | * | . | . | . | * | . |
| BE | 1 | . | * | * | * | * | * | . |
| A2 | 1 | . | * | . | . | . | * | . |
| A2 | 1 | . | * | . | . | . | * | . |

Apart from the high bit being set, we clearly have an "A" again. In fact, the second set of 64 characters differ from the first only in that the high bit is set. The first set corresponds to the Inverse characters and the second to the Flashing. The third set of 64 are an exact repeat of the first set. They correspond to the control characters, the numerals, and the special characters of the Normal set.

The final set of 64 characters consist of the Normal set of U.C. letters, plus a redundant set of special characters which exactly duplicate the Flashing set. They do not, however, produce Flashing characters. These character sets are shown in Table 7, on page 15 of the reference manual and are called the ASCII screen characters.(I find this a somewhat confusing title, since the "S" means standard.)

It is interesting to investigate what happens during the printing of these characters. However you decide to do it, using machine language, the "Print" command, or a POKE to the screen, the result is the same. The Apple screen character code of the character you want printed is placed in the RAM that is mapped to the video screen. At this point the hardware takes over, "looking up" the dot pattern from the bit pattern in the Character Generator ROM, and placing it in the mapped position on the screen.

In printing to the screen, bit seven is not used for the dot pattern, so this gives a grid of eight dots high (eight bytes) and seven dots wide (the seven least significant bits of each byte). In Integer or Assembly language, the character codes you use are the Apple Screen character codes, (or "negative" ASCII) while Applesoft uses ASCII character codes. To get the Apple screen characters from ASCII, all that is needed is to set the high bit of the character code, or in BASIC, add 128 to the ASCII code.

Take for example the characters: 3, B, z.

—◉→

# CHARACTER GENERATOR ROM

| | ASCII | | | APPLE SCREEN | | |
|---|---|---|---|---|---|---|
| CHAR | DEC | HEX | BINARY | DEC | HEX | BINARY |
| 3 | 51 | $33 | 00110011 | 179 | $B3 | 10110011 |
| B | 66 | $42 | 01000010 | 194 | $C2 | 11000010 |
| z | 90 | $5A | 01011010 | 218 | $DA | 11011010 |

This is accomplished by the Applesoft "OUTDO" routine at $DB5C. It is a short routine, but has a number of interesting features. Its function is to print the character in the Accumulator at the cursor position. The first instruction, ORA #$80, sets the high bit to make the character the same as the corresponding APPLE SCREEN character.

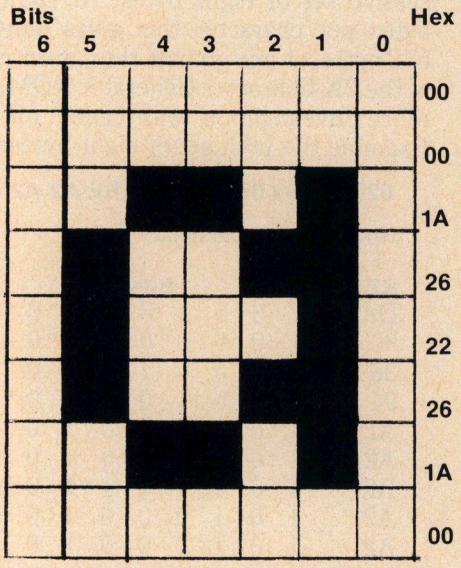
The instruction of particular interest to lowercase users, however, is $DB62 - ORA $F3. The function of this is to act as a "mask in" to force bit six high for the printing of Flashing characters. The Normal value of $F3 is 0, but during printing when FLASH is in effect, the value is 64 i.e., %01000000. The ORA instruction is an inclusive OR, and is often used to force a "1" at a selected bit location. It can also be used by the programmer as a "mask in" for bit five if $F3 is set to $20 i.e., %00100000 or Dec 32. This causes uppercase characters to be printed as lowercase characters, without changing program text. For example:

**Z binary 11011010 ORA #$20**
**11111010 = z.**

As a simple method of converting uppercase printing to lowercase printing, (provided you have a lowercase ROM to display it) try the command: **POKE 243, 32.** Note that this is reset to 0 by NORMAL and to 64 by FLASH. (This is the reason PLE screws up your output sometimes. Under some circumstances if you are in lowercase during a GET statement and press RESET, for some reason $40 ends up in $F3).

Unfortunately, this has gotten a bit off the topic. The idea is to build the code that can be used to burn the code for a Character Generator ROM into a 5V. 2716 EPROM. Particularly, we want to use those last 32 character locations, containing redundant characters, for a set of lowercase characters. Unfortunately this will be limited (for the time being) to those who have revision seven boards or later, since these will take a 5V.2716 EPROM as a replacement for the Character Generator ROM.

The standard method, I believe, is to use a grid. Shade in the squares to make your character, convert this into Binary and then HEX for burning into the EPROM. Something like this:




Since the high bit must be set for Screen Characters 192–255, these would in fact become **80 80 9A A6 A2 A6 9A 00.** You can see that this could become an extremely tedious business. Consider the time involved in working out all the characters, typing them in, changing your mind when you do not like the style of letter, (e.g. many would not like the above "a") and retyping. Remember also, you must edit typing errors (usually after you have burned the ROM). All time consuming factors.

Obviously, a computer should be able to do all this tedious work. My attention was therefore drawn to Higher Text. (If you do not have it, you should buy it). Surely, I thought, for the small fonts, Higher Text must use a similar method of representing its characters. A small font, I found, is 1K in length, and the last 768 bytes seemed to be the same format as the Character Generator ROM.

I quickly located the now familiar "A" and checked it on a grid. It was the same as the Character Generator ROM, so I cheerfully replaced the last 768 bytes of the font with the last 768 bytes of the code from the Character Generator ROM.

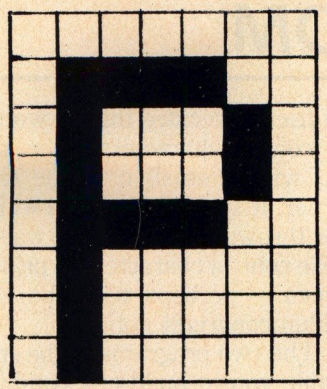
I then fired up the small font editor and loaded in the font I had created. The "A" was just great, since it cannot be back-to-front, however the majority of the characters were in this form. I had forgotten that the Hi-Res screen reads a byte from right to left. Just a small amount of effort was extended to alleviate this problem.

The first two programs demonstrate how to do this. The function of the Assembly language program is to reverse the order of bits 0-6 of each of the last 768 bytes from the Character Generator ROM code (that we have downloaded), so that the code has the same format as the Higher Text font code. The Applesoft program merely does the donkey work. You could do it from the keyboard if you plan to use it only once or twice.

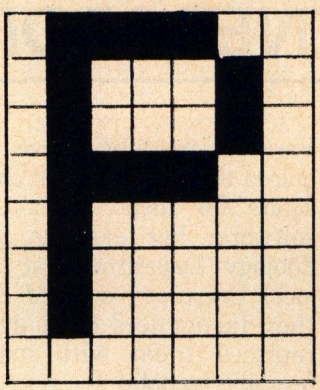
So far, our accomplishments have not been of great practical use, yet hopefully of interest. I did, however, find it useful to download the ApLcase chip into the Higher Text small font editor to find out why I liked some letters and not others. The edit window really shows how a character is constructed.

Now to use the small font editor to create our own lowercase character set. The beauty of using Higher Text is that you do not need to create your own sets. Someone else has already done this for you. Personally I did not like the style of any of them enough to have them permanently in the machine. If you do choose to make your own lowercase letters, here are a few things that you should consider.

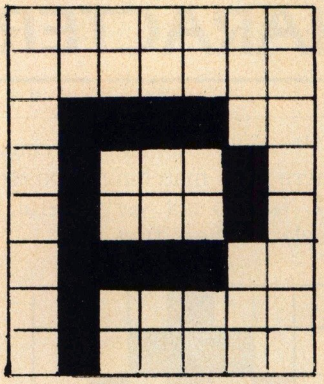
1) Descenders. Lowercase letters look unnatural if they do not descend "below the line." For example, "tails" of the p's, q's, and g's, etc. must descend "below the line" created by the bottom of the nondescending characters. This will necessitate moving the uppercase characters up one dot.



standard "P"

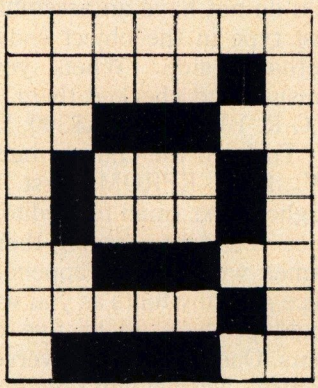


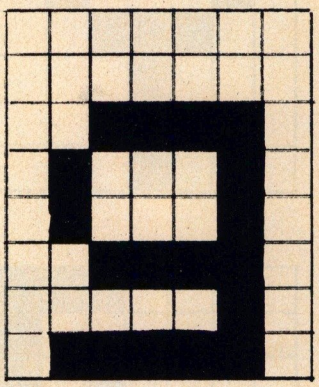
moved up one dot



lowercase p descending

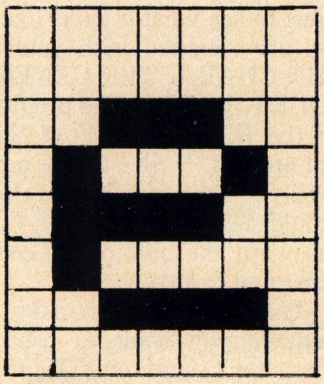
(2) Open letters without serifs (curly bits) are easier to read. Compare these two g's

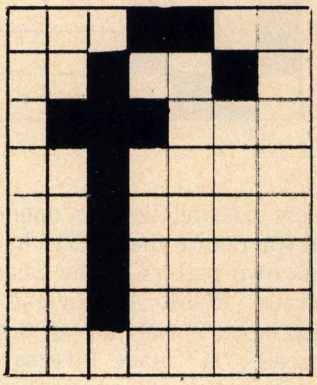


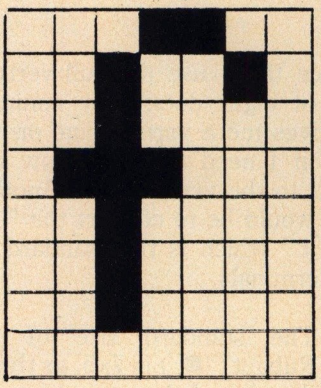


The second g is plain and text containing this kind of letter is much easier to read.

(3) Keep the letters consistent.







The first f will look better in text than the second because the cross piece is the same height as the top of the e (or any other lowercase letter).

So much for lowercase letters. There are a few other things to consider, but I will leave that to you because many of them are a matter of personal preference. What about the other six characters?

The last 32 ASCII characters are:

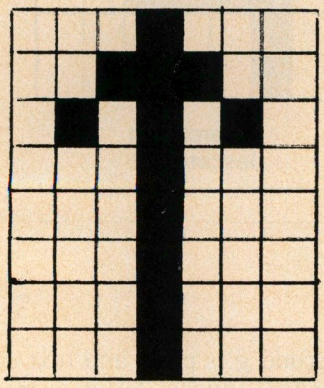
` a b c d e f g h i j k l m n o p q
r s t u v w x y z {¦}~ ■

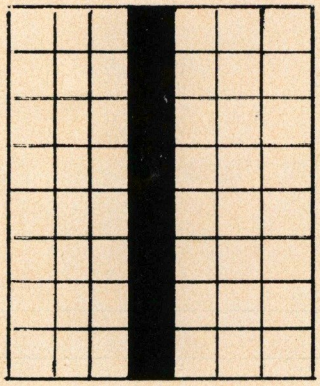
The last 32 characters (the six specials in particular) are not used much in any software because they would not be compatible with standard machines. This means that you can substitute your own characters provided you realize that they will be nonstandard both to other machines and to printers. Some of the changes that I have made, either for myself or others are:

—◉→

# CHARACTER GENERATOR ROM

(1) "`" is redundant because there is no matching opposite. "|" is also not very useful. I replaced these two with:



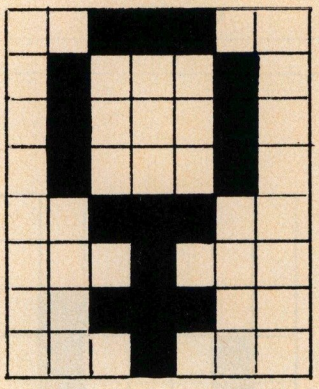


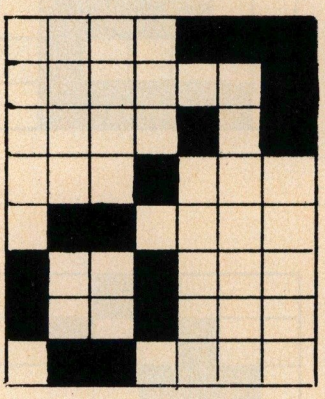
Since these use the full vertical range of eight dots, they connect. This gives me a vertical line on the screen if I need it. The arrow will connect to the vertical line. Another option would be to convert the "^" to a " ↑ " which is the standard on some terminals.

(2) The standard size of the Rubout ("■") is 7x5, as this is the size of the capital letters. If it is made the full 8x7, however, it can be interconnected, both vertically and horizontally, to give borders etc. In effect it gives an Inverse blank without having to type ...

**INVERSE: PRINT " ": NORMAL.**

(3) Various specialists have required their own special characters for their "in house" software. For example, the Zoology Department at the local University decided that they did not need { or } and I replaced them with male/female symbols:





New possibilities are opened up when you realize that every character has its own pattern in the Character Generator ROM. An Inverse "A," for example, is not just an ordinary uppercase "A" made Inverse. Even the control characters have their own pattern. It is only the COUT routine that prevents them being printed to the screen. You can in fact POKE them there. Try (in Applesoft) clearing the screen, and then:

```
FOR I = 128 TO 168: POKE 1320
+ I, I : NEXT.
```

Now try to copy over the text you see displayed, with the forward arrow. On some terminals the control characters can be displayed. One of my friends decided that he would like his control characters to be similar, i.e., with a small c in the top left corner. It's amazing what a whim like this throws up. Some software uses these control characters in printing to screen – perhaps as some sort of hidden copyright notice.

The two programs at the end will enable you to build any combination of character sets you choose. The Applesoft program is straightforward. I have used Big Mac to assemble C.G.R.BUILDER. If your Assembler does not support Macros, then ignore lines 42–50 and ignore all lines with **<<<** or **>>>** in them. If you do not have an assembler, then just type in the object code on the lefthand side. When you have finished and checked them, BSAVE C.G.R. BUILDER, A$300, L170.

To build the code to burn into a 5V. 2716 EPROM, first use the Higher Text small font editor to produce your fonts. Saving them under names with ". SF" appended. Produce as many fonts as you wish. You could produce up to five different fonts. One for each of Inverse, Flash, Control, Normal and Lowercase.

Before burning a ROM it is a good idea to save the font as a generator and use it with some software that does a reasonable amount of printing – just to see what it looks like. When you are satisfied with your font(s), RUN CHARACTER GENERATOR CODE BUILDER. The program asks for the Higher Text Font Name. (It will append ". SF" to the name you supply). To save time, this font should be your main font. (The one you want the bulk of the code to be generated from).

The program then asks for the filename you want to use for the Character Generator ROM Code and saves the 2K of code as Filename. CGR. At this point, you can quit or insert a subset into the code from another font. This replaces any of the five subsets in the code. i.e., Inverse, Flashing Control, Normal, or lowercase. Now you have on your disk a 2K Binary file, Filename.CGR, which you can burn into a 5V. 2716 EPROM.

If you do not have a EPROM burner, then maybe you have a friend who does. I have found both the Apparat burner and the supporting software excellent. It has only two drawbacks that prospective buyers should be aware of. First, it has no onboard switch to isolate the ROM socket. This necessitates turning the computer off before you insert an EPROM. Second, the software is written for the APEX operating system. You can read Apple DOS binary files, but you cannot write them. This means that you have to use tape if you want to transfer the code from a ROM you have downloaded onto an Apple DOS disk.

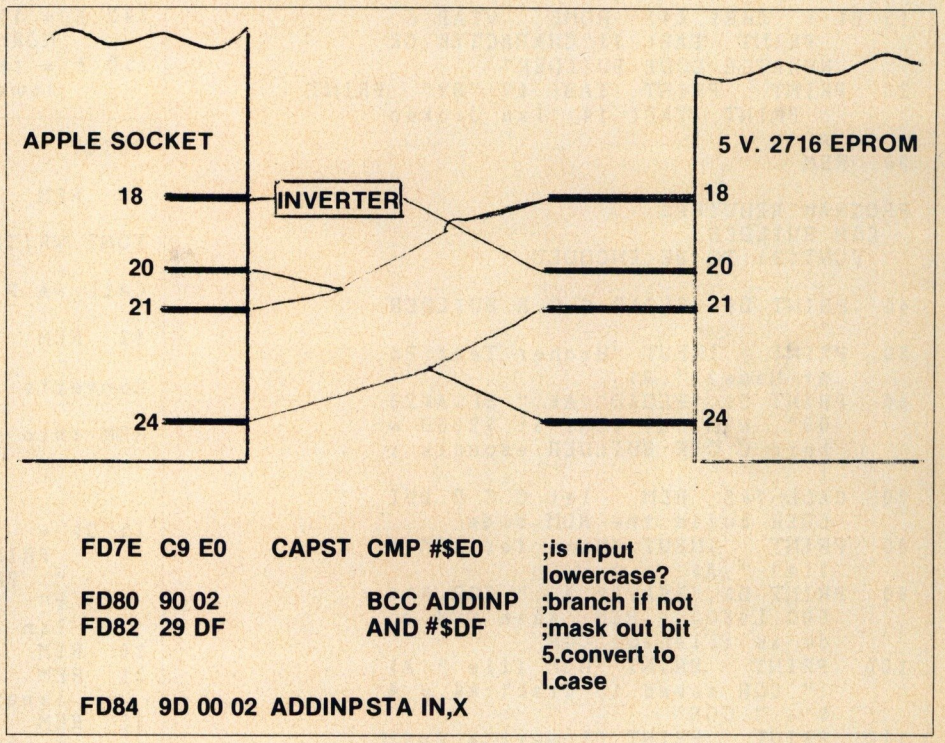
Installing the new ROM is remarkably simple. Follow the instructions in Dan Paymer's article in *Call -A.P.P.L.E.* MAY '82 for removing the case. On the main board, underneath where the keyboard normally would be, you will find a 24 pin ROM labelled ROM SPCL. Remove this and replace it with your 5V. 2716 EPROM, making sure the notch in the ROM goes to the power supply side of the board.

To input lowercase you will need to use PLE, or some other keyboard intercepter, which bypasses the F8 ROM routine converting all input to uppercase. I find the PLE Ctrl A/S, uppercase/lowercase shiftlock quite convenient. The only software I have found that is not compatible with your new Character Generator ROM is Apple-Writer. The authors used the redundant blank ($EO), that we have replaced, as their space. There is a patch to fix it, however, in a letter from Dan Paymer in *Call-A.P.P.L.E.* Jan 81.

At this time let me include a final note to programmers who wish to replace Apple ROMs with 5V. 2716 EPROMs. The pin arrangement of the 5V.2716 EPROM is nearly the same, but the select polarities are wrong. The following arrangement (using a header so as not to clip the pins of the EPROM) will fix this problem. For clarity, only the named pins in the diagram are shown.

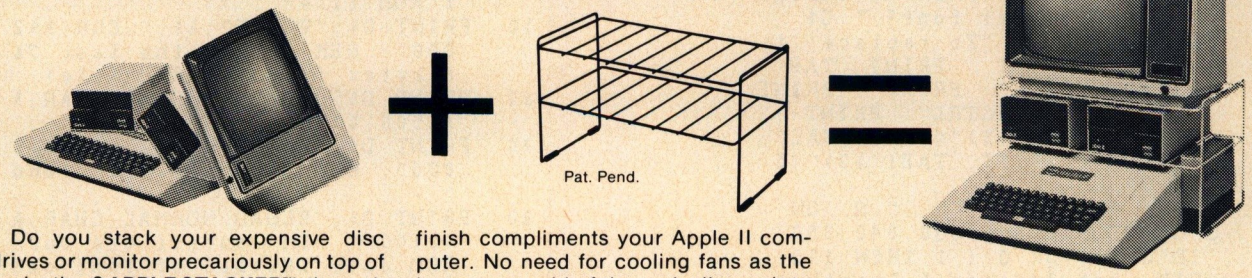
There are a number of changes Assembly language programmers can make to the F8 ROM, that will not alter it significantly from standard, but are none the less very useful. An example of particular importance to lowercase users is the CAPST routine:

The offending instruction is at $FD82. Changing $FD83 to $FF will convert AND #$DF to AND #$FF which will leave the input unchanged.




```
FD7E  C9 E0     CAPST  CMP #$E0      ;is input
                                     lowercase?
FD80  90 02            BCC ADDINP    ;branch if not
FD82  29 DF            AND #$DF      ;mask out bit
                                     5.convert to
                                     l.case
FD84  9D 00 02 ADDINP  STA IN,X
```


# the SECURITY EQUATION

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# CHARACTER GENERATOR ROM

```
]LIST

10  REM

CHARACTER GENERATOR ROM CODE
BUILDER BY IAN M JACKSON

CALL -A.P.P.L.E. : NOV. 1982

12  REM

 Builds code for a Character

Generator ROM from H-T.SF

15 D$ =  CHR$ (4): HOME : VTAB 6:
      PRINT  TAB( 3)"CHARACTER GE
     NERATOR CODE BUILDER"
20  PRINT : PRINT  TAB( 19)"BY": PRINT
     : PRINT  TAB( 14)"Ian Jackso
     n"
30  REM

PROGRAM REQUIRES:
  CGR BUILDER.
   FONT(S) TO BE ENCODED.

40  PRINT D$;"BLOAD C.G.R.BUILDER
    "
50  PRINT : INPUT "Higher Text Fo
     nt Name? ";A$
60  PRINT D$;"BLOAD";A$;".SF,A$20
     00": REM put font at $2000 w
     here C.G.R.BUILDER expects i
     t.
70  CALL 768: REM   let C.G.R.BUI
     LDER build the ROM code
80  PRINT : INPUT "Name for ROM f
     ile? ";A$
90  PRINT D$;"BSAVE";A$;".CGR,A$4
     000,L$800": REM  save ROM co
     de as filename.CGR
100  PRINT : PRINT "ROM file ";A$
     ;" CGR saved to disk":A$ = A
     $ + ".CGR"
110  PRINT : PRINT "Insert a cust
     omized subset? (Y/N) ";: GET
     B$: IF B$ <  > "N" AND B$ <
      > "Y" THEN 110
115  IF B$ = "N" THEN  END : REM
     quit here if all code from 1
      font
120  HOME : VTAB 6: PRINT : INPUT
     "Name of subset font? ";C$
130  PRINT : PRINT "To replace: (
     1) INV": PRINT : PRINT  TAB(
     13)"(2) FLASH": PRINT : PRINT
      TAB( 13)"(3) CTRL": PRINT :
      PRINT  TAB( 13)"(4) NORMAL"
     : PRINT : PRINT  TAB( 13)"(5
     ) L.CASE"
140  INPUT "Select a No. ";Q: ON
     Q GOSUB 310,320,330,340,350:
      IF Q > 5 OR Q < 1 THEN 120:
      REM  get Address & Length o
     f subset
150  PRINT D$;"BLOAD";C$;".SF,A$2
     000": CALL 768: REM  get new
      font & let C.G.R.BUILDER do
      its stuff again
160  PRINT D$;"BSAVE TEMP,A";A;",
     L";L: REM  save the section
     of code to be inserted.
170  PRINT D$;"BLOAD ";A$;",A$400
     0": REM  get the ROM code fr
     om disk
180  PRINT D$;"BLOAD TEMP": PRINT
     : INPUT "New file name? ";A$
     : REM   insert the subset we
      saved as TEMP
190  PRINT D$;"BSAVE";A$;".CGR,A$
     4000,L$800": REM  save the R
     OM code
200  PRINT D$;"DELETE TEMP": GOTO
     100
310 A = 16384:L = 512: RETURN : REM
     INVERSE Address & Length
320 A = 16896:L = 512: RETURN : REM
     FLASHING
330 A = 17408:L = 256: RETURN : REM
      CONTROL
340 A = 17664:L = 512: RETURN : REM
     NORMAL
350 A = 18176:L = 256: RETURN : REM
     lowercase
```

```
]LIST

10  REM

FONT WRITER BY IAN JACKSON

CALL -A.P.P.L.E. : NOV. 1982

12  REM

Converts a Character Generator

ROM into a HIGHER TEXT.SF



15 D$ =  CHR$ (4): HOME : VTAB 6:
      PRINT  TAB( 14)"FONT WRITER
     ": PRINT : PRINT  TAB( 19)"B
     Y": PRINT : PRINT  TAB( 14)"
     Ian Jackson"
20  REM   Disk must contain:
21  REM   INVERTER (the assembly
      language program)
22  REM   NORMAL.SF (so we can us
     e its front end. Any font wo
     uld do)
23  REM   ROM FILE (that we have
      downloaded from a Character
      Generator ROM)
30  PRINT D$;"BLOAD INVERTER"
40  PRINT : PRINT : INPUT "Name o
     f ROM file? ";A$
50  PRINT D$;"BLOAD";A$;".CGR,A$2
     000": REM   save the last 76
     8 bytes from the ROM file)
60  PRINT D$;"BSAVE NORMAL CHAR,A
     $2500,L$300"
70  PRINT D$;"BLOAD NORMAL.SF,A$2
     000": REM  for its front end

80  PRINT D$;"BLOAD NORMAL CHAR,A
     $2100": REM  substitute our
     ROM code instead of font cod
     e
90  PRINT D$"DELETE NORMAL CHAR"
100  CALL 768: REM  reverse the o
     rder of bits 0->6
110  PRINT : INPUT "Name of font?
      ";A$
120  PRINT D$;"BSAVE";A$;".SF,A$2
     000,L$400": REM  save font t
     o disk
130  PRINT : PRINT A$;".SF saved
     to disk"
```

```
:ASM
                 ********************************
                 *                              *
                 * CHARACTER GENERATOR BUILDER  *
                 *                              *
                 * Builds a character set from  *
                 * a HIGHER-TEXT font in the    *
                 * format required for a char.  *
                 * generator ROM. Load font @   *
                 * SOURCE. ROM code will be     *
                 * Found @ ROMSTART...2K long   *
                 *                              *
                 * Call -A.P.P.L.E. : Nov. 1982 *
                 *                              *
                 * Save OBJ. as C.G.R.BUILDER   *
                 *                              *
                 ********************************



                 SOURCE   =    $2000       ;Address font loaded
                 ROMSTART =    $4000       ;Start of ROM code to be built
                 INVERSE  =    ROMSTART    ;hi bit off-start inverse chars
                 FLASH    =    ROMSTART+$200 ;hi bit on-start of FLS.chars
                 CTRL     =    ROMSTART+$400 ;hi bit off-start CTRL chars
                 PNORMAL  =    ROMSTART+$500 ;hi bit off-NORM specls & NO.s
                 NORMAL   =    ROMSTART+$600 ;hi bit on-start NORM letters
                 LCASE    =    ROMSTART+$700 ;hi bit on-start of lower case
                 SPECLNO  =    SOURCE+$100 ;loc. of specls & NOs in font
                 LETTERS  =    SOURCE+$200 ;loc. of Ucase letters in font
                 LCASEF   =    SOURCE+$300 ;loc. of lcase letters in font
                 COUNT    =    $8
                 TEMP     =    $9

                 *Scratch loc.s for indirect
                 *addressing of font & ROM code

                 ADDR     =    $6
                 ADDR1    =    $18
                 ADDR2    =    $1A
                 ADDR3    =    $1C
                 ADDR4    =    $1E


                          ORG  $300
                          DO   0
                 LABELIN  MAC              ;Label into address
                          LDA  #<]1        ;low byte of label
                          STA  ]2          ;to address low
                          LDA  #>]1        ;hi byte of label
                          STA  ]2+1        ;to address hi
                          <<<
                          FIN

                 *Reverse order of bits 0->6 to be
                 *consistant with char. gen ROM. Hi-RES
                 *screen reads bits from right->left

0300: A9 00               LDA  #0
0302: 85 08               STA  COUNT
0304: A8                  TAY
                          >>>  LABELIN    SPECLNO;ADDR
0305: A9 00               LDA  #<SPECLNO  ;low byte of label
0307: 85 06               STA  ADDR       ;to address low
0309: A9 21               LDA  #>SPECLNO  ;hi byte of label
030B: 85 07               STA  ADDR+1     ;to address hi
                          <<<
030D: A2 07      LOOP1    LDX  #7         ;7 bits to shift
030F: B1 06               LDA  (ADDR),Y
0311: 6A         LOOP     ROR             ;shift l.s.bit -> carry
0312: 26 09               ROL  TEMP       ;from carry to temp <-
0314: CA                  DEX
0315: D0 FA               BNE  LOOP       ;loop 7 X
0317: A5 09               LDA  TEMP       ;get result
0319: 09 80               ORA  #$80       ;set high bit
031E: 91 06               STA  (ADDR),Y   ;put it back
031D: C8                  INY
031E: D0 ED               BNE  LOOP1      ;loop 256 X
0320: E6 07               INC  ADDR+1     ;incr. addr. by 256
0322: E6 08               INC  COUNT
```

```
0324: A5 08      75              LDA   COUNT
0326: C9 03      76              CMP   #3            ; 3 pages yet?
0328: D0 E3      77              BNE   LOOP1
                 78
                 79
                 80    * Move in labels for indirect addressing
                 81
                 82
                 83              >>>   LABELIN       LETTERS;ADDR
032A: A9 00      83              LDA   #<LETTERS     ;low byte of label
032C: 85 06      83              STA   ADDR          ;to address low
032E: A9 22      83              LDA   #>LETTERS     ;hi byte of label
0330: 85 07      83              STA   ADDR+1        ;to address hi
                 83              <<<
                 84              >>>   LABELIN       INVERSE;ADDR1
0332: A9 00      84              LDA   #<INVERSE     ;low byte of label
0334: 85 18      84              STA   ADDR1         ;to address low
0336: A9 40      84              LDA   #>INVERSE     ;hi byte of label
0338: 85 19      84              STA   ADDR1+1       ;to address hi
                 84              <<<
                 85              >>>   LABELIN       FLASH;ADDR2
033A: A9 00      85              LDA   #<FLASH       ;low byte of label
033C: 85 1A      85              STA   ADDR2         ;to address low
033E: A9 42      85              LDA   #>FLASH       ;hi byte of label
0340: 85 1B      85              STA   ADDR2+1       ;to address hi
                 85              <<<
                 86              >>>   LABELIN       NORMAL;ADDR3
0342: A9 00      86              LDA   #<NORMAL      ;low byte of label
0344: 85 1C      86              STA   ADDR3         ;to address low
0346: A9 46      86              LDA   #>NORMAL      ;hi byte of label
0348: 85 1D      86              STA   ADDR3+1       ;to address hi
                 86              <<<
                 87              >>>   LABELIN       CTRL;ADDR4
034A: A9 00      87              LDA   #<CTRL        ;low byte of label
034C: 85 1E      87              STA   ADDR4         ;to address low
034E: A9 44      87              LDA   #>CTRL        ;hi byte of label
0350: 85 1F      87              STA   ADDR4+1       ;to address hi
                 87              <<<
                 88
                 89    * Build INV, FLS, CTRL, & NORMAL letters
                 90
0352: A0 00      91              LDY   #0
0354: B1 06      92    LETTERLP  LDA   (ADDR),Y      ;Get source
0356: 91 1A      93              STA   (ADDR2),Y     ;Flash
0358: 91 1C      94              STA   (ADDR3),Y     ;Normal
035A: 29 7F      95              AND   #$7F          ;Remove high bit
035C: 91 18      96              STA   (ADDR1),Y     ;Inverse
035E: 91 1E      97              STA   (ADDR4),Y     ;Control
0360: C8         98              INY
0361: D0 F1      99              BNE   LETTERLP      ;256 Characters?(32*8bytes/char)
                 100             >>>   LABELIN       LCASEF;ADDR ;Addrs of LC in font
0363: A9 00      100             LDA   #<LCASEF      ;low byte of label
0365: 85 06      100             STA   ADDR          ;to address low
0367: A9 23      100             LDA   #>LCASEF      ;hi byte of label
0369: 85 07      100             STA   ADDR+1        ;to address hi
                 100             <<<
                 101             >>>   LABELIN       LCASE;ADDR3
036B: A9 00      101             LDA   #<LCASE       ;low byte of label
036D: 85 1C      101             STA   ADDR3         ;to address low
036F: A9 47      101             LDA   #>LCASE       ;hi byte of label
0371: 85 1D      101             STA   ADDR3+1       ;to address hi
                 101             <<<
0373: B1 06      102   LCASELP   LDA   (ADDR),Y      ;L.C.source
0375: 91 1C      103             STA   (ADDR3),Y     ;L.C.code
0377: C8         104             INY
0378: D0 F9      105             BNE   LCASELP       ;Branch if not 256 char. yet
                 106
                 107
                 108   * Do special chars & numerals.(2nd half
                 109   * of INV & FLS so start 256 bytes in)
                 110
                 111
                 112             >>>   LABELIN       SPECLNO;ADDR
037A: A9 00      112             LDA   #<SPECLNO     ;low byte of label
037C: 85 06      112             STA   ADDR          ;to address low
037E: A9 21      112             LDA   #>SPECLNO     ;hi byte of label
0380: 85 07      112             STA   ADDR+1        ;to address hi
```

```
                    112             <<<
                    113             >>>   LABELIN     INVERSE+256;ADDR1
0382:  A9  00       113             LDA   #<INVERSE+256 ;low byte of label
0384:  85  18       113             STA   ADDR1        ;to address low
0386:  A9  41       113             LDA   #>INVERSE+256 ;hi byte of label
0388:  85  19       113             STA   ADDR1+1      ;to address hi
                    113             <<<
                    114             >>>   LABELIN     FLASH+256;ADDR2
038A:  A9  00       114             LDA   #<FLASH+256  ;low byte of label
038C:  85  1A       114             STA   ADDR2        ;to address low
038E:  A9  43       114             LDA   #>FLASH+256  ;hi byte of label
0390:  85  1B       114             STA   ADDR2+1      ;to address hi
                    114             <<<
                    115             >>>   LABELIN     PNORMAL;ADDR3
0392:  A9  00       115             LDA   #<PNORMAL    ;low byte of label
0394:  85  1C       115             STA   ADDR3        ;to address low
0396:  A9  45       115             LDA   #>PNORMAL    ;hi byte of label
0398:  85  1D       115             STA   ADDR3+1      ;to address hi
                    115             <<<
                    116
                    117
                    118   * Move in special chars. & numerals
                    119
                    120                                                    |--End assembly--
039A:  A0  00       121             LDY   #0                               |
039C:  B1  06       122   SPECLP    LDA   (ADDR),Y                         |170 bytes
039E:  91  1A       123             STA   (ADDR2),Y    ;hi bit on for fls  |
03A0:  29  7F       124             AND   #$7F         ;remove hi bit      |Errors: 0
03A2:  91  18       125             STA   (ADDR1),Y    ;Inverse
03A4:  91  1C       126             STA   (ADDR3),Y    ;Normal
03A6:  C8           127             INY
03A7:  D0  F3       128             BNE   SPECLP       ;Branch if not 256 char. yet
03A9:  60           129             RTS
```

```
:ASM                  1     ********************************
                      2     *                              *
                      3     *          INVERTER            *
                      4     *                              *
                      5     * To convert bytes from a      *
                      6     * character generator ROM to   *
                      7     * correct format for HIGHER    *
                      8     * TEXT (HI-RES screen reads    *
                      9     * bytes low->high)             *
                      10    *                              *
                      11    * Call -A.P.P.L.E. : Nov. 1982 *
                      12    *                              *
                      13    * FONT will be at $2000- chars *
                      14    * begin at $2100, $300 long    *
                      15    *                              *
                      16    ********************************
                      17
                      18
                      19    COUNT     =     $08
                      20    ADDR      =     $06
                      21    TEMP      =     $09
                      22
                      23
                      24              ORG   $300
0300:  A9  00         25              LDA   #0
0302:  85  06         26              STA   ADDR         ;low byte of $2100
0304:  85  08         27              STA   COUNT
0306:  A8             28              TAY                ;zero Y
0307:  A9  21         29              LDA   #$21         ;chars. to begin at $2100
0309:  85  07         30              STA   ADDR+1
030B:  A2  07         31    LOOP1     LDX   #7           ;7 bits to shift
030D:  B1  06         32              LDA   (ADDR),Y
030F:  6A             33    LOOP      ROR                ;shift bit -> carry
0310:  26  09         34              ROL   TEMP         ;from carry to temp <-
0312:  CA             35              DEX
0313:  D0  FA         36              BNE   LOOP
0315:  A5  09         37              LDA   TEMP         ;get result
0317:  09  80         38              ORA   #$80         ;set high bit
0319:  91  06         39              STA   (ADDR),Y     ;put it back
031B:  C8             40              INY
031C:  D0  ED         41              BNE   LOOP1        ;loop if not 256
031E:  E6  07         42              INC   ADDR+1       ;incr. addr. by 256  |--End assembly--
0320:  E6  08         43              INC   COUNT                             |
0322:  A5  08         44              LDA   COUNT                             |41 bytes
0324:  C9  03         45              CMP   #3           ; 3 pages yet?       |
0326:  D0  E3         46              BNE   LOOP1                             |Errors: 0
0328:  60             47              RTS
```

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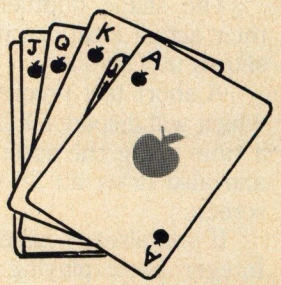
# Playing Card Generator



Vincent Aderente

THE Hi-Res playing cards routines described within this article are based upon Jim Hilger's Integer Basic playing card generator and shapes as described in the Nov/Dec, 1979 and Jan, 1980 issues of *Call -A.P.P.L.E.* The Integer Basic routines are included on Diskpaks 7A and 7B. The three major changes made to the Integer Basic version are:

1. The assembler program and shape tables are located at the high end of usable memory on a 48K Apple - from 34675 ($8773) to 38399 ($95FF), since Applesoft programs normally are loaded from 2049 up.
2. The assembler program does "JSR's" to the firmware Applesoft Hi-Res routines "HPOSN" and "DRAW" instead of to the Integer Basic Hi-Res routines which had to be loaded into memory.
3. A shape table has been included between the assembler program and the actual shapes, so that individual shapes (see table) may be used in a program directly using Applesoft Hi-Res commands such as "DRAW".

To generate a Hi-Res playing card using the already-loaded routines, five POKEs and a CALL are needed, as follows:

**POKE 38360 with X MOD 256**
**POKE 38361 with X / 256 (usually zero)**
**POKE 38370 with Y**
**POKE 38380 with RANK (0 = erase existing card)**
**POKE 38390 with SUIT (0 = draw back of card)**
**CALL 34675**

X and Y are the coordinates of the upper-left corner of the card. Each card is 39 horizontal dots by 40 vertical dots. Card images may overlap if you wish.

RANK is a number from 0 to 13 (0 = erase card, 1 = 2, 2 = 3.... 12 = king, 13 = ace).

RANK is a number from 0 to 13 (0 = back of card, 1 = clubs, 2 = diamonds, 3 = hearts, 4 = spades).

When using the routines, be sure to set HIMEM: to 34674.

The computerized representation of a deck of cards then becomes a series of numbers from 1 to 52 as shown in the table 1.

To *translate* the above deck into the rank and suit parameters needed by the assembler program, use the following formulas:

**RANK = C - INT((C-1) / 13) * 13**
**SUIT = INT((C-1/13) + 1)**

**Where "C" is any number from 1 to 52**

To use the individual shapes directly in Applesoft (using "DRAW" or "XDRAW"), first issue the following POKEs to indicate the start of the shape table at $8BCB (35787):

**POKE 233,139 ($8B)**
**POKE 232,203 ($CB)**

**Table 1**

| Rank | Clubs | Diamonds | Hearts | Spades |
|---|---|---|---|---|
| Deuce | 1 | 14 | 27 | 40 |
| Three | 2 | 15 | 28 | 41 |
| Four | 3 | 16 | 29 | 42 |
| Five | 4 | 17 | 30 | 43 |
| Six | 5 | 18 | 31 | 44 |
| Seven | 6 | 19 | 32 | 45 |
| Eight | 7 | 20 | 33 | 46 |
| Nine | 8 | 21 | 34 | 47 |
| Ten | 9 | 22 | 35 | 48 |
| Jack | 10 | 23 | 36 | 49 |
| Queen | 11 | 24 | 37 | 50 |
| King | 12 | 25 | 38 | 51 |
| Ace | 13 | 26 | 39 | 52 |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# PLAYING CARD GENERATOR

The shape numbers to use and their actual locations in memory are shown in Table 2:

A short test program is included which will display all 52 cards four at a time using the assembler routine, and also draw all 28 shapes on the screen.

If you already have a copy of the Integer Basic playing card routines (Diskpak 7A or 7B), you can set up the new Applesoft routines by:

1. BLOADing "PCARD".
2. Go into the Monitor and issue the following command:

***8C05<1000.19CFM**

3. From the monitor, enter the hex code for the playing card generator program from $8773 to $8BB5.
4. While still in the Monitor, enter the shape table location information from $8BCB (35787) to $8C04 (35844).
5. Issue the command "BSAVE ACARD,A34675,L3725".

If you do not already have a copy of the Integer Basic playing card routine, use the hex dump provided to enter the actual shapes starting at $8C05 (35845), then follow steps 3 to 5 above.

A summary of the combined assembled program and shape table is presented in Table 3:

**Table 2**

| Shape Number | Description | Location Hex | Decimal |
|---|---|---|---|
| 1 | Small Club | 8C05 | 35845 |
| 2 | Small Diamond | 8C15 | 35861 |
| 3 | Small Heart | 8C25 | 35877 |
| 4 | Small Spade | 8C35 | 35893 |
| *5 | King | 8C45 | 35909 |
| *6 | Queen | 8DCC | 36300 |
| *7 | Jack | 8F53 | 36691 |
| *8 | Blank Front ** | 90DA | 37082 |
| *9 | Back of Card | 9261 | 37473 |
| 10 | Zero | 93E8 | 37864 |
| 11 | One | 9402 | 37890 |
| 12 | Two | 941C | 37916 |
| 13 | Three | 9436 | 37942 |
| 14 | Four | 9450 | 37968 |
| 15 | Five | 946A | 37994 |
| 16 | Six | 9484 | 38020 |
| 17 | Seven | 949E | 38046 |
| 18 | Eight | 94B8 | 38072 |
| 19 | Nine | 94D2 | 38098 |
| 20 | Large Club | 94EC | 38124 |
| 21 | Large Diamond | 9506 | 38150 |
| 22 | Large Heart | 9520 | 38176 |
| 23 | Large Spade | 953A | 38202 |
| 24 | Ten | 9554 | 38228 |
| 25 | "J" (for Jack) | 956E | 38254 |
| 26 | "Q" (for Queen) | 9588 | 38280 |
| 27 | "K" (for King) | 95A2 | 38306 |
| 28 | "A" (for Ace) | 95BC | 38332 |

* Each of these shapes represent one-half of a full card. These shapes are drawn once, then rotated 180 degrees and drawn again from the bottom up.

** A card is erased by drawing the front in black.

Any number from zero to nine can be referenced to the above shape table by adding ten to it in a program (ex., "DRAW N + 10 AT X,Y").

```
]LIST

5  REM

THOMAS CHIRPICH : CALL -A.P.
P.L.E.

10  TEXT : HOME
20  DIM H(15),L(15)
30  FOR I = 1 TO 15: READ H(
I),L(I): NEXT
40  FOR J = 8 TO 20 STEP 4
50  FOR I = 1 TO 15: COLOR=
L(I): PLOT I,J: NEXT
60  NEXT
70 J = 9
80  FOR I = 1 TO 15: COLOR=
H(I): PLOT I,J: NEXT
90  FOR I = 1 TO 15:H(I) = H
(I) + 4: NEXT
100 J = J + 4: IF J > 21 THE
N  END
110  GOTO 80
120  DATA 0,3,0,1,0,12,0,12,
2,13,0,1,2,14,1,0,2,14,1,0,2
,14,0,12,2,14,0,5,2,14
```

**Table 3**

| Description | Decimal From | Decimal To | Hex From | Hex To |
|---|---|---|---|---|
| Card Generator Program | 34675 | 35765 | 8773 | 8BB5 |
| Blank Space | 35766 | 35786 | 8BB6 | 8BCA |
| Shape Table | 35787 | 35844 | 8BCB | 8C04 |
| Shapes | 35845 | 38358 | 8C05 | 95D6 |
| Scratch For Program | 38359 | 38399 | 95D7 | 95FF |

**PROGRAM**

```
*8773.8BB5

8773- A9 01 85 E7 4C
8778- A1 87 98 18 6D E2 95 48
8780- 8A 18 6D D8 95 AA A9 00
8788- 6D D9 95 A8 68 20 11 F4
8790- 60 AD F7 95 85 1C AD F8
8798- 95 20 01 F6 60 00 00 00
87A0- 00 AE F6 95 F0 0D CA F0
87A8- 0D CA F0 21 CA F0 35 CA
87B0- F0 49 60 4C E6 8A A9 EC
87B8- 8D 9D 87 A9 94 8D 9E 87
87C0- A9 05 8D 9F 87 A9 8C 8D
87C8- A0 87 4C 12 88 A9 06 8D
87D0- 9D 87 A9 95 8D 9E 87 A9
87D8- 15 8D 9F 87 A9 8C 8D A0
87E0- 87 4C 12 88 A9 20 8D 9D
87E8- 87 A9 95 8D 9E 87 A9 25
87F0- 8D 9F 87 A9 8C 8D A0 87
87F8- 4C 12 88 A9 3A 8D 9D 87
8800- A9 95 8D 9E 87 A9 35 8D
8808- 9F 87 A9 8C 8D A0 87 4C
8810- 12 88 AE EC 95 D0 03 4C
8818- A3 8B CA D0 03 4C 91 88
8820- CA D0 03 4C CC 88 CA D0
8828- 03 4C E3 88 CA D0 03 4C
8830- 3E 89 CA D0 03 4C 55 89
8838- CA D0 03 4C 8E 89 CA D0
8840- 03 4C B7 89 CA D0 03 4C
8848- 15 8A CA D0 03 4C 3E 8A
8850- CA D0 03 4C 6A 8A CA D0
8858- 03 4C 7E 8A CA D0 03 4C
8860- 92 8A CA D0 03 4C 6B 88
8868- 4C B2 87 20 D8 8A A9 BC
8870- 8D A6 8A A9 95 8D A7 8A
8878- 20 2A 8B A2 10 A0 10 20
8880- 7A 87 A9 00 8D F8 95 AE
8888- 9D 87 AC 9E 87 20 91 87
8890- 60 20 D8 8A A9 1C 8D A6
8898- 8A A9 94 8D A7 8A 20 2A
88A0- 8B A2 10 A0 03 20 7A 87
88A8- A9 00 8D F8 95 AE 9D 87
88B0- AC 9E 87 20 91 87 A2 16
88B8- A0 24 20 7A 87 A9 20 8D
88C0- F8 95 AE 9D 87 AC 9E 87
88C8- 20 91 87 60 20 D8 8A A9
88D0- 36 8D A6 8A A9 94 8D A7
88D8- 8A 20 2A 8B 20 7B 88 20
88E0- A1 88 60 20 D8 8A A9 50
88E8- 8D A6 8A A9 94 8D A7 8A
88F0- 20 2A 8B A2 08 A0 03 20
88F8- 7A 87 A9 00 8D F8 95 AE
8900- 9D 87 AC 9E 87 20 91 87
8908- A2 18 A0 03 20 7A 87 AE
8910- 9D 87 AC 9E 87 20 91 87
8918- A2 0E A0 24 20 7A 87 A9
8920- 20 8D F8 95 AE 9D 87 AC
8928- 9E 87 20 91 87 A2 1E A0
8930- 24 20 7A 87 AE 9D 87 AC
8938- 9E 87 20 91 87 60 20 D8
8940- 8A A9 6A 8D A6 8A A9 94
8948- 8D A7 8A 20 2A 8B 20 F3
8950- 88 20 7B 88 60 20 D8 8A
8958- A9 84 8D A6 8A A9 94 8D
8960- A7 8A 20 2A 8B 20 F3 88
8968- A2 08 A0 10 20 7A 87 A9
8970- 00 8D F8 95 AE 9D 87 AC
8978- 9E 87 20 91 87 A2 18 A0
8980- 10 20 7A 87 AE 9D 87 AC
8988- 9E 87 20 91 87 60 20 D8
8990- 8A A9 9E 8D A6 8A A9 94
8998- 8D A7 8A 20 2A 8B 20 65
89A0- 89 A2 10 A0 0C 20 7A 87
89A8- A9 00 8D F8 95 AE 9D 87
89B0- AC 9E 87 20 91 87 60 20
89B8- D8 8A A9 B8 8D A6 8A A9
89C0- 94 8D A7 8A 20 2A 8B 20
89C8- F3 88 A2 08 A0 0C 20 7A
89D0- 87 A9 00 8D F8 95 AE 9D
89D8- 87 AC 9E 87 20 91 87 A2
89E0- 18 A0 0C 20 7A 87 AE 9D
89E8- 87 AC 9E 87 20 91 87 A2
89F0- 0E A0 1B 20 7A 87 A9 20
89F8- 8D F8 95 AE 9D 87 AC 9E
8A00- 87 20 91 87 A2 1E A0 1B
8A08- 20 7A 87 AE 9D 87 AC 9E
8A10- 87 20 91 87 60 20 D8 8A
8A18- A9 D2 8D A6 8A A9 94 8D
8A20- A7 8A 20 2A 8B 20 C7 89
8A28- A2 10 A0 07 20 7A 87 A9
8A30- 00 8D F8 95 AE 9D 87 AC
8A38- 9E 87 20 91 87 60 20 D8
8A40- 8A A9 54 8D A6 8A A9 95
8A48- 8D A7 8A 20 2A 8B 20 C7
8A50- 89 20 28 8A A2 16 A0 1F
8A58- 20 7A 87 A9 20 8D F8 95
8A60- AE 9D 87 AC 9E 87 20 91
8A68- 87 60 20 F7 8A A9 6E 8D
8A70- A6 8A A9 95 8D A7 8A 20
8A78- 2A 8B 20 78 8B 60 20 08
8A80- 8B A9 88 8D A6 8A A9 95
8A88- 8D A7 8A 20 2A 8B 20 78
8A90- 8B 60 20 19 8B A9 A2 8D
8A98- A6 8A A9 95 8D A7 8A 20
8AA0- 2A 8B 20 78 8B 60 00 00
8AA8- A9 FF 8D F7 95 A2 00 A0
8AB0- 00 20 7A 87 A9 00 8D F8
8AB8- 95 AE A6 8A AC A7 8A 20
8AC0- 91 87 A2 26 A0 27 20 7A
8AC8- 87 A9 20 8D F8 95 AE A6
8AD0- 8A AC A7 8A 20 91 87 60
8AD8- A9 DA 8D A6 8A A9 90 8D
8AE0- A7 8A 20 A8 8A 60 20 A3
8AE8- 8B A9 61 8D A6 8A A9 92
8AF0- 8D A7 8A 20 A8 8A 60 20
8AF8- A3 8B A9 53 8D A6 8A A9
8B00- 8F 8D A7 8A 20 A8 8A 60
8E08- 20 A3 8B A9 CC 8D A6 8A
8B10- A9 8D 8D A7 8A 20 A8 8A
8B18- 60 20 A3 8B A9 45 8D A6
8B20- 8A A9 8C 8D A7 8A 20 A8
8B28- 8A 60 A2 00 A0 03 20 7A
8B30- 87 A9 00 8D F7 95 8D F8
8B38- 95 AE A6 8A AC A7 8A 20
8B40- 91 87 A2 00 A0 0B 20 7A
8B48- 87 AE 9D 87 AC 9E 87 20
8B50- 91 87 A2 26 A0 24 20 7A
8B58- 87 A9 20 8D F8 95 AE A6
8B60- 8A AC A7 8A 20 91 87 A2
8B68- 26 A0 1C 20 7A 87 AE 9D
8B70- 87 AC 9E 87 20 91 87 60
8B78- A2 0A A0 06 20 7A 87 A9
8B80- 00 8D F8 95 AE 9F 87 AC
8B88- A0 87 20 91 87 A2 1C A0
8B90- 21 20 7A 87 A9 20 8D F8
8B98- 95 AE 9F 87 AC A0 87 20
8BA0- 91 87 60 A9 DA 8D A6 8A
8BA8- A9 90 8D A7 8A A9 00 8D
8BB0- F7 95 20 AD 8A 60
```

**SHAPE TABLE**

```
*8BCB 8C04

8BCB- 1C 00 3B 00 4B
8BD0- 00 5B 00 6B 00 7B 00 02
8BD8- 02 89 03 10 05 97 06 1E
8BE0- 08 38 08 52 08 6C 08 86
8BE8- 08 A0 08 BA 08 D4 08 EE
8BF0- 08 08 09 22 09 3C 09 56
8BF8- 09 70 09 8A 09 A4 09 BE
8C00- 09 D8 09 F2 09
```


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# PLAYING CARD GENERATOR

**SHAPES**

```
*8C05.95D6
8C05- 29 2D 3A
8C08- 3B 33 2D 2D 3E 3B 33 09
8C10- 0D 1A 3B 13 00 09 0D 1A
8C18- 3F 17 2D 2D 1E 3F 17 09
8C20- 0D 1A 1B 13 00 29 29 3A
8C28- 3F 37 2D 2D 1E 3F 17 09
8C30- 0D 1A 1B 13 00 09 0D 1A
8C38- 3F 17 2D 2D 3E 3B 33 09
8C40- 0D 1A 3B 13 00 29 2D 2D
8C48- 2D 2D 2D 2D 2D 2D 2D 2D
8C50- 2D 2D 2D 2D 2D 2D 2D 2D
8C58- 3A 3F 3F 3F 3F 3F 3F 3F
8C60- 3F 3F 3F 3F 3F 3F 3F 3F
8C68- 3F 3F 3F 37 2D 2D 2D 2D
8C70- 2D 2D 2D 2D 2D 2D 2D 2D
8C78- 2D 2D 2D 2D 2D 2D 2D 3E
8C80- 3F 3F 3F 3F 3F 3F 3F 3F
8C88- 3F 3F 3F 3F 3F 3F 3F 3F
8C90- 3F 3F 37 2D 2D 2D 2D 09
8C98- 09 09 09 09 09 09 09 09
8CA0- 09 09 29 2D 2D 2D 3E 3F
8CA8- 3F 3F 1F 3F 3B 1F 1F 1F
8CB0- 1F 1F 3F 3F 3F 1F 3F 3F
8CB8- 3F 37 2D 2D 2D 2D 29 2D
8CC0- 2D 2D 0D 09 09 09 2D 29
8CC8- 2D 29 2D 2D 2D 3E 3F 3F
8CD0- 3F 1F 1B 1B 1B 3B 3B 3F
8CD8- 3F 3F 3F 3F 1F 3F 3F 3F
8CE0- 37 2D 2D 2D 2D 29 2D 2D
8CE8- 2D 0D 0D 0D 0D 09 09 09
8CF0- 29 2D 2D 2D 3E 3F 3F 3F
8CF8- 1F 1B 1F 3F 3B 3B 3F 3F
8D00- 3F 3F 3F 1F 3F 3F 3F 37
8D08- 2D 2D 2D 2D 29 2D 2D 2D
8D10- 0D 09 0D 0D 0D 2D 09 29
8D18- 2D 2D 2D 3E 3F 3F 3F 1F
8D20- 1B 3F 3F 3B 3B 3F 1F 3F
8D28- 3F 3F 1F 3F 3F 3F 37 2D
8D30- 2D 2D 2D 29 2D 2D 09 09
8D38- 09 29 0D 2D 0D 09 29 2D
8D40- 2D 2D 3E 3F 3F 3F 1F 1B
8D48- 1B 1F 1B 1B 1B 1B 1B 1B
8D50- 3F 1F 3F 3F 3F 37 2D 2D
8D58- 2D 2D 09 09 2D 09 09 09
8D60- 2D 2D 09 09 09 29 2D 2D
8D68- 2D 3E 3F 3F 3F 1F 1B 1B
8D70- 3B 3F 3B 1F 1B 3B 1F 1F
8D78- 1B 3F 3F 3F 37 2D 2D 2D
8D80- 2D 09 0D 0D 2D 09 2D 09
8D88- 2D 29 29 09 29 2D 2D 2D
8D90- 3E 3F 3F 3F 1F 3B 1F 1F
8D98- 3F 1F 3B 3B 3F 3B 3B 1F
8DA0- 3F 3F 3F 37 2D 2D 2D 2D
8DA8- 29 29 29 29 0D 09 29 0D
8DB0- 0D 0D 0D 29 2D 2D 2D 3E
8DB8- 3F 3F 3F 1F 3F 3B 3B 3B
8DC0- 1F 1B 3B 1F 1F 1F 1F 3F
8DC8- 3F 3F 37 00 29 2D 2D 2D
8DD0- 2D 2D 2D 2D 2D 2D 2D 2D
8DD8- 2D 2D 2D 2D 2D 2D 2D 3A
8DE0- 3F 3F 3F 3F 3F 3F 3F 3F
8DE8- 3F 3F 3F 3F 3F 3F 3F 3F
8DF0- 3F 3F 37 2D 2D 2D 2D 2D
8DF8- 2D 2D 2D 2D 2D 2D 2D 2D
8E00- 2D 2D 2D 2D 2D 2D 3E 3F
8E08- 3F 3F 3F 3F 3F 3F 3F 3F
8E10- 3F 3F 3F 3F 3F 3F 3F 3F
8E18- 3F 37 2D 2D 2D 2D 09 09
8E20- 09 09 09 09 09 09 09 09
8E28- 09 29 2D 2D 2D 3E 3F 3F
8E30- 3F 1F 3F 1F 1B 1F 3B 1B
8E38- 3F 3F 3F 3F 1F 3F 3F 3F
8E40- 37 2D 2D 2D 2D 29 2D 2D
8E48- 2D 2D 29 2D 09 0D 29 2D
8E50- 29 2D 2D 2D 3E 3F 3F 3F
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95C0- 3B 3B 13 29 09 29 1A 1F
95C8- 1B 17 29 2D 2D 1A 1F 1B
95D0- 17 29 09 29 02 00 00
```

```
]LIST

10  REM

 HI-RES  PLAYING CARDS TEST

    BY  VINCE ADERENTE

CALL -A.P.P.L.E. : NOV. 1982

PROGRAM DISPLAYS ALL 52 CARDS
AND 28 INDIVIDUAL SHAPES

12  HIMEM: 34674
15  LOMEM: 16384
20  CLEAR : TEXT : HOME : SPEED=
     255: SCALE= 1
30 D$ =  CHR$ (4): REM  CNTRL-D
40  PRINT D$;"BLOAD ACARDS"
50  DIM C(52)
60  POKE 233,139: POKE 232,203: REM
     SHAPE TABLE STARTING LOCATI
    ON
100  REM  SET UP CARDS
110  FOR I = 1 TO 52
120 C(I) = I
130  NEXT I
140 I = 0
150  GOTO 1000
500  REM  GET A NEW CARD
510 I = I + 1
600  REM  SET RANK AND SUIT
610 R = (C(I) - 1) - ( INT ((C(I)
     - 1) / 13) * 13) + 1
620 S =  INT ((C(I) - 1) / 13) +
    1
630  RETURN
700  REM  DISPLAY CARD
710  POKE 38360,X: POKE 38361,0: POKE
     38370,Y: POKE 38380,R: POKE
     38390,S: CALL 34675: RETURN

1000  REM  DISPLAY CARDS FOUR AT
    A TIME
1010  HGR
1020  HCOLOR= 5: HPLOT 0,55 TO 27
    9,55: HPLOT 0,56 TO 279,56
1025  FOR K = 1 TO 13
1030 X = 10:Y = 5
1040  GOSUB 500: GOSUB 600: GOSUB
    700
1050 X = 60: GOSUB 500: GOSUB 600
    : GOSUB 700
1060 X = 10:Y = 65
1070  GOSUB 500: GOSUB 600: GOSUB
    700
1080 X = 60: GOSUB 500: GOSUB 600
    : GOSUB 700
1090  VTAB 21: PRINT "PRESS ANY K
    EY TO CONTINUE";: GET OP$: PRINT

2000  NEXT K
2050  HOME : VTAB 21: PRINT "FINA
    L DEMONSTRATION:"
2060  PRINT "   BACK OF CARD AND
    ERASE CARD"
2070  FOR J = 1 TO 1000: NEXT J
2080 X = 10:Y = 5:R = 1:S = 0: GOSUB
    700
2090 X = 60:R = 0:S = 1: GOSUB 70
    0
3000  FOR J = 1 TO 1000: NEXT J
3010  CALL 62450:X = 0:Y = 10: HCOLOR=
    7: ROT= 0
3020  HOME : VTAB 21: PRINT "AND
    THE 28 INDIVIDUAL SHAPES"
3030  FOR N = 1 TO 4
3035 X = X + 10: IF X > 279 THEN
    X = 279
3040 X = X + 10
3050  DRAW N AT X,Y
3060  NEXT N
3070 X = 10:Y = 30
3080  FOR N = 5 TO 9
3090  DRAW N AT X,Y
3100 X = X + 50
3110  NEXT N
3120 X = 10:Y = 100
3130  FOR N = 10 TO 28
3140  DRAW N AT X,Y
3150 X = X + 10
3160  NEXT N
3170  END
```

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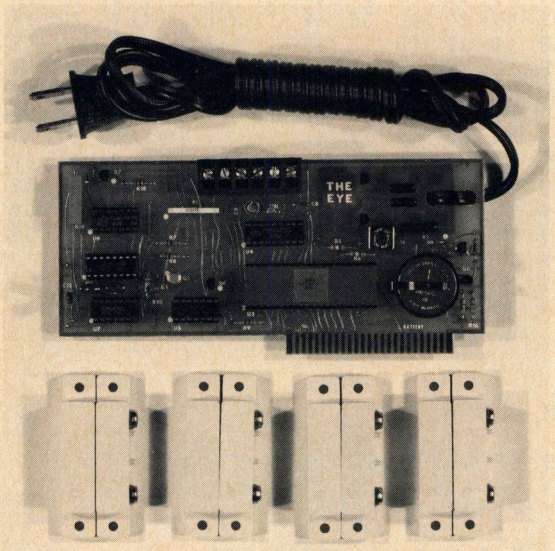


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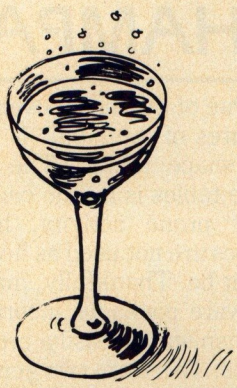
A Call —A.P.P.L.E. Review:

# Champagne Graphics (On a Beer Budget)

Andrew L. Berentes



## Introduction

WHEN I decided to buy an Apple, a very important feature was its graphics capability. While more recently introduced personal computers have sported some pretty impressive graphics, I think the Apple has stood up quite well. All things considered, the Apple is just as desirable a graphics machine as it was when first introduced.

One of the many wise decisions made while designing the Apple was to include features that, while not always easy to use, provided the potential for very powerful functions. Probably no one visualized the sophistication of Raster Blaster or Sneakers—to name my two favorite arcade games—in those long gone days when Apple Vision and Internal Combustion Engine were considered sensational animations. But the potential was there, awaiting talented programmers to bring it out.

This article reviews four graphics packages for the Apple. All were written with the intention of bringing the best of Apple graphics within the reach of the average user. They were selected for review based on two criteria: that they made high quality Apple graphics easier to achieve, and that they did so at a reasonable cost.

This second consideration ruled out such devices as the Graphics Tablet and the Versawriter. Since I could not afford them, I assumed that others shared that difficulty. The packages reviewed range in price from $35 to $80, and one should be within reach of almost any budget.

A surprising result of my investigation was that no one package emerged as the overall best. In fact, each has certain features in which it excels. Selecting one thus becomes a matter of weighing strengths, weakness, and costs. The goal of this article is to make the reader's selection process easier.

I would like to thank each of the companies who have made their software available for my use. The packages which I will discuss are:

*Higher Graphics II*
by Robert C. Clardy
Synergistic Software
$35.00

*E–Z Draw 3.3*
by Nasir Gebelli and
Jerry W. Jewell
Sirius Software
$49.95

*The Complete Graphics System II*
by Mark Pelczarski
Penguin Software
$69.95

*The Artist*
by Warren Schwader
On–Line Systems
$79.95

There are two important areas to consider. The first, of course, concerns the graphics capabilities themselves. The power of these systems varies widely. In general, as the power goes up the difficulty of use goes up as fast or faster. So, the second area concerns the user interface. How easy is it to use the advanced features you are paying for? How easy is it to correct mistakes? How much time do you have to spend learning to use the system, time which you could spend drawing? This second area is often a matter of opinion, and I will therefore give you my opinions.

This article will necessarily make extensive reference to technical aspects of Apple graphics. Unfortunately, if all of these technical considerations were explained in full, the explanations would be as long as the article. The beginner is, therefore, referred to any of the excellent articles about Apple graphics that have appeared over the years. The Applesoft manual contains a good if technical discussion of basic aspects of shape tables. An excellent series of articles on Apple graphics has been written by Ken Williams and published in *Softline* magazine. These articles are reprinted in the appendix of The Artist. *Softline* is available by subscription for $12.00 a year.

*Softline Circulation*
Box 60
North Hollywood, CA 91603

All of these packages use equipment native to the Apple—the paddles or keyboard—to control drawing. This is an inherently inferior method of drawing, for one sort of motion, the rotating of a paddle for example, must be converted into another sort of motion such as a squiggly line. In its most basic form this is usually called the Etch-A-Sketch mode, and anyone who has tried to draw a circle on one of those contraptions will appreciate the difficulty. However, several ingenious methods of reducing the problem of drawing have emerged, and these will be discussed and rated.

Incidentally, one trick that helps a lot with Etch–A–Sketch drawing is to reproduce your original art work as a line drawing on clear film. This may be taped over the screen of the monitor, thus providing a guide for tracing. Such art may be produced on graphic art film and on some Xerox copiers. Alternatively, a permanent marker may be used to create the artwork directly on clear film. The resulting ease of drawing is well worth this extra step.

# CHAMPAGNE GRAPHICS

One of the most powerful graphics features of the Apple is its ability to use shape tables. The creation of these tables is a time consuming and error prone activity, however, so shapes are not used as heavily as they might be. Thankfully, many graphics software packages incorporate some mechanism of easily creating shape tables. There are two general ways of doing this.

The first method, which I will call the Scanning Mode, converts a drawing which has already been made into a shape table. The artist specifies a rectangle surrounding the drawing and calls up the shape maker. The shape maker traces over every point within that rectangle and translates it into a shape vector, which is either turned on or off. The resulting vector tables are then assembled into a multi-shape table. This is a quick way to do things, and works very nicely with drawings which are already completed. Unfortunately, it is very inefficient of memory, for every point within the rectangle is represented by a three-bit vector designation whether it is important to the shape or not. In general it takes HV/2 bytes to store a shape, where H and V are the dimensions in dots. Also, the shapes are frequently not too attractive when scaled up.

The second mode I will call the Plotting Mode. With this mode, the user draws the shape by moving a cursor around the screen, often with the I,J,K, and M keys. As the cursor moves around it draws the shape vectors. Each vector is automatically translated into shape table form by the program. These individual shapes can then be assembled to make up tables. This method is efficient of memory and can use any type of vector, but it can be tedious. If the user has a picture that he wants to turn into a shape, he must draw it from scratch. A catch of this method is that the Apple cannot use two non-plotting up vectors in succession; this produces a 00 byte which is also the flag for the end of a shape. Some shape routines cope with this problem better than others.

## HIGHER GRAPHICS II

More, perhaps, than any other package, Higher Graphics exploits the shape table ability of the Apple. The user can create shapes and assemble them into tables; further, old tables can be edited and their shapes shuffled and assembled into new shape tables. This emphasis on shapes results in some stylistic differences in Higher Graphics which are frequently quite useful, as we shall see.

The shape maker module is a fairly conventional Plotting Mode unit. A cursor is moved about the screen by keyboard commands; as the cursor is moved, vectors are entered into the shape being created. One complaint I have is that two non-plotting up vectors in succession abort the shape. This is inconvenient, is not state-of-the-art, and should probably be fixed. Add Shape Mode allows the shapes created to be added to an already existing shape table.

The strength of Higher Graphics does not really lie in its shape creation mode; other programs are as good or better. With Higher Graphics, however, comes the Shape Shuffler, which allows shapes to be selected from any number of shape tables; these shapes may then be assembled into a new shape table. This suggests the possibility of maintaining a library of shapes and selecting from among the shapes for a new program.

Finally, once all of these shapes have been drawn, they may be used in the drawing mode, called the Screen Creator. Most of the features of Screen Creator are reminiscent of other paddle oriented drawing packages. Either lines or continuous curves may be drawn by manipulating the paddles. Shapes may be called up, scaled, rotated, colored, and plotted. This is all very easy to do, but there are no surprises yet.

Suprises there are, however. The first appears when a shape is drawn at a scale larger than one. When a shape is scaled conventionally, its vectors grow longer but not wider. The end result can be a shape consisting of many long, spindly lines surrounding ugly black areas. Areas that appear solid at scale 1 merely appear as cross-hatched when scaled up. When Higher Graphics increases the scale, the vectors become squares of appropriate sizes. Solid areas remain solid, and the enlarged shapes are generally more attractive. No other package scales shapes this nicely; this is a very effective feature.

Suprise number two is that the characters for the text generator are based on shape tables. Text in the other packages is based on matrices of dots. Thus, Higher Graphics can manipulate its text in the same way that it manipulates shapes. Text may be drawn at any angle; one can, for example, write around the circumference of a circle. None of the other packages allows such complete freedom of text placement and usage.

Unfortunately, it is considerably more difficult to edit or create fonts with Higher Graphics, as there is no font editor. Fonts could be created with the Shape Maker, but this would be marginally more tedious. Still, fonts *can* be created, and the power of Higher Graphics text mode may well justify the time investment.

The documentation of Higher Graphics is excellent, although a reference card would be a welcome addition. For the newcomer to Apple graphics, there is a ten page introduction to the use of shape tables in programs.

Higher Graphics is the only package reviewed that will function under Integer BASIC. Hi-Res support routines are included for this purpose.

Considering its low price Higher Graphics has some very nice features. It is unlocked, well documented, and provides the most often needed graphics capabilities. The shape routines are quite powerful, and provide unique abilities to manipulate shape tables and to include shapes in artwork.

## E-Z DRAW 3.3

E-Z Draw represents a dramatic departure from other graphics packages. For one thing, it is completely keyboard controlled using keystrokes even to draw irregular lines; this approach has both advantages and disadvantages. Further, E-Z Draw lacks two features which I would very much like to see, namely shape table routines, and color fill. These shortcomings are, however, balanced by some extremely powerful features.

Especially important is the text generator which is borrowed from Higher Text; Higher Text is simply the best text generator currently available for the Apple, and its inclusion in E–Z Draw is a significant plus. Another plus is the ability to treat whole sections of the screen as entities, to be moved, rotated, flipped, enlarged, or shrunk; this does not replace a shape table feature, but it allows some operations not possible with shapes.

The place E–Z Draw really shines for me is in the ease with which it is used. Unlike The Complete Graphics System, which contains almost every conceivable feature, E–Z Draw has chosen a subset of very powerful features and has made them very easy to use. The size of the subset is such that the user can remember the majority of commands after a very short period of usage, very quickly becoming highly proficient. E–Z Draw very successfully walks a tightrope between power and usability.

E–Z Draw represents a great deal of creative thinking in an attempt to make drawing easier. Drawing revolves not around the paddles but around the familiar IJKM quadrant of keys. A plus–shaped cursor is moved around on the graphics screen with these four keys, just as the editing cursor is moved in Applesoft. The distance that the cursor moves with each stroke may be varied from one to nine dots, allowing precision to alternate with speed. Anyone who has tried to move a graphics cursor exactly one dot with the game paddles will appreciate the advantage of such a feature.

This also makes the graphics cursor more stable. Paddle readings are often a bit unstable, and this can result in a cursor that jumps around. Drawing a line that is exactly vertical or horizontal under these conditions is difficult to say the least. E–Z Draw's approach completely eliminates this problem.

Pressing the space bar causes E–Z Draw to remember the point presently defined by the cursor. The two most recent points may be stored, and these, along with the current cursor position can, define a triangle, a circle, or an ellipse. Various shapes may be drawn simply by defining two or three points and then calling a function. For example, a circle may be drawn by defining the center and a point on the circumference, and then pressing the C key. Other shapes which may be drawn automatically are rectangles, triangles, ellipses, and parallelograms. Additionally, any of these shapes may be drawn filled in by the current color; fill is initiated by holding the control key while pressing the key which initiates drawing. The whole procedure is fun and effortless.

Lines are also drawn by moving the cursor. The user may either define the end points of a line, or he can leave a trail behind as the cursor moves. On a complex curve, every point must be individually placed, and this can be very, very tedious. While great precision is thus possible, there is a considerable tax placed on the patience of the user. Despite the tedium, however, I prefer keyboard control to an Etch–a–Sketch mode of drawing. The keyboard is not a substitute for a graphics tablet or a Versawriter, but it seems to be the next best thing.

Should any A.P.P.L.E. member be unfamiliar with Higher Text, I refer him to Val Golding's article in the June 1981 *Call – A.P.P.L.E.*. E–Z Draw includes several fonts which are not included with Higher Text, some of which are quite nice; and, of course, you can load fonts from Higher Text. Not included, however, are the font editors, so if you want to create your own fonts, you will have to purchase Higher Text, which is something you should own anyway. None of the packages reviewed equals E–Z Draw for text generation, although The Complete Graphics System comes fairly close.

While lacking shape table routines, E–Z Draw has a group of astounding screen manipulation routines. Any rectangular portion of the screen can be captured and manipulated as an entity. For example, the user can define an area and turn it upside down, or obtain a mirror image of it. The area may be slanted to right or left, compressed or expanded in height or width, or rotated through 90 degrees. Further, most of these functions retain the coloration of the original artwork, sacrificing color only when the limitations of the Apple come into play. A section of the screen may be defined, saved to disk, and redrawn anywhere on the screen, even on another graphic. These features are extremely powerful, and alone might justify the purchase of E–Z Draw for the serious Apple artist.

A key to reduced frustration in graphics work is the saving of work in progress, thus reducing the work needed to redo a ruined drawing. In addition to saving to disk, E–Z Draw can save work in progress to the secondary graphics page. This is faster and more convenient and is therefore more likely to be done frequently.

E–Z Draw is a great package: easy to use and powerful. While it leaves out some features, most notably color fill, this is a minor sin; there are many packages which may be used to add color to the final drawing. E–Z Draw compliments the other packages on the market very nicely, and would be my choice for the creation of most line drawings and text. Its unique features make it highly desirable. Any Apple artist should seriously consider the acquisition of E–Z Draw.

**The Complete Graphics System**

(This article was prepared with reference to an edition of this program, current a year ago. The latest version is The Complete Graphics System II.)

The Complete Graphics System, which I will call CGS, is an attempt to combine in one package almost every graphics feature known to man. Indeed, a vast array of features are available, including a drawing mode, color fill, shape table routines (two of these), a 3–D graphics module, a text generator, and a shrink utility. In short, if you want a feature, it is probably included. So, why haven't I blurted out my praise for CGS?

The manual begins with the warning, "Do not expect to sit down and master all of the capabilities of this system at once." While using CGS, I am frequently reminded of this statement; the manual is my constant companion, even for simple operations, since the procedures are often surprisingly complicated. In general, if I am going to use CGS, I want to be doing something I cannot do more easily with another package. There are several such things, and I will address them later in this review.

The difficulty of using CGS is, I believe, the result of two things. First, it makes extensive use of the game paddles, forcing the user to alternate back and forth from keyboard to paddles. Secondly, where some programs make one command perform a variety of related tasks, CGS will use a different command for each task. —

To turn on a feature, CGS will ask you to press one key or button, while another key or button turns it off. Most other packages toggle features on and off with a single key.

To define an ellipse, three points must be specified: the two foci and one point on the ellipse itself. With E-Z Draw, the points are all defined by setting the cursor where desired and then pressing the space bar. CGS requires that the first point be specified by pressing an E, the second point by pressing button 0, and the third point by pressing button 1. However, since the points must all be specified in the above order, the function of the point is sufficiently defined by the order of entry; the use of a different key or button for each point is redundant and is just something extra to remember. One other problem with the CGS approach, is that once the E key is pressed, the user is committed to defining an ellipse; all three points must be specified before the procedure may be aborted.

While using CGS, I feel overwhelmed by the need to remember and execute complex series of commands. Even the excellent command chart which is provided does not completely ease these feelings. Since this is in large part a personal and subjective reaction, some users may feel my criticism is unjustified. In fact, CGS is a very popular package, judging from the *Softalk* software poll, and it might be just what you need. If you are attracted to the impressive features of CGS, try to use it before you buy. Although difficulty of use is a personal thing, it is important; if a package is too complicated to use, it will not be used.

In addition to creating circles and ellipses, the Drawing module of CGS has line plot and an Etch-a-Sketch mode. I find curves difficult to draw, however; to draw a curve, it is necessary to hold down button 0 while deftly manipulating the two paddles. I suggest that Etch-a-Sketch is hard enough without having to hold down a button in the process.

A brush option allows an air-brush effect, with nine sizes of brushes. Interestingly, the brushes are contained in a shape table, which may be modified by the user who wishes to design his own brushes.

CGS offers two ways of creating shapes. One mode is unique to CGS, but produces shape tables that will resemble those from a Scanning Mode shape maker. A rectangle is defined; then the paddles and buttons are used to turn points on and off in that rectangle. This is facilitated with a Low-Res display which effectively blows up a Hi-Res picture several times. The resulting drawing is converted into a shape when the user is finished creating it. This is a very fast method of producing shapes, but has two drawbacks. First, the shapes have a maximum width and height of 38 vectors. Second, shapes created in this way are inefficient to store since they require a vector to be stored for each point in the rectangle, whether it is important to the shape or not.

The second mode of shape creation is a Plotting Mode. CGS is marginally superior to Higher Graphics here since two consecutive non-plotting up vectors may be entered without blowing up the system, a very nice feature. Unfortunately, CGS does not include a way to edit existing shape tables. Such a feature is very useful and is one of the strong points of Higher Graphics.

Also included is a color fill routine which can generate 108 colors. As far as I know, this is the largest menu of colors provided by any graphics package. Although a color chart is not provided, the Palette option allows the user to preview several colors on a screen, testing for color interactions.

While the Text Module is neither as versatile nor as easy to use as Higher Text, it is very good. It allows the use of fonts based on either a 7x8 matrix or a 14x16 matrix, much like Higher Text. Font editors allow the user to create both large and small fonts; samples of each size are included. The large font can use any of the 108 colors provided by CGS, compared to the ten colors provided by Higher Text. Also, the Text Module may be used under control of a BASIC program, something which cannot be done with the version of Higher Text provided by E-Z Draw. Nor can the E-Z Draw owner create or modify fonts unless he has also purchased Higher Text.

The 3-D Graphics Module must be seen to be fully appreciated. With this module it is possible to define and display shapes in three dimensions. These shapes may be rotated in three directions, around any point in the shape. The perspective of the shape may be altered, along with the size. Flat shapes may be assembled into 3-D shapes using the Panel Utility; this is much easier than trying to create a shape in three dimensions. It is all very impressive and just loads of fun. This is probably my favorite feature of CGS, and is available separately as the 3-D Graphics System.

The Shrink Utility allows the user to reduce an entire Hi-Res screen to one quarter screen size. This allows four pictures to fit on one screen. Unfortunately, color is not usually preserved when the picture is shrunk.

A praiseworthy feature of CGS is its openness to working with outside programs. If you are not aware of this, Penguin Software has chosen to unlock its software. (Thank you Mark ...I hope this works out for you). Several of the files are designed so that they may be controlled from the user's own programs. Such files include the Color Fill routine and the Text Routine, and instructions are included for using these routines under control of a BASIC program.

If you have ever wondered how Ken Williams got so many pictures on Wizard and the Princess (a DOS 3.3 disk will only hold about 14 normal Hi-Res pictures), CGS holds the key. Notice that the pictures in Wizard are drawn as they come up; then they are color filled by a program probably much like Color Fill in CGS. CGS makes this procedure available to the BASIC programmer. Pictures can now be created using HPLOTs; then the necessary information is fed to Color Fill in order to fill in the areas in the picture. This technique could save some 30 sectors per picture.

Also included are instructions for generating the data arrays needed by the 3-D Shape Module. Thus, a BASIC program which results in spatial data could store that data for display as a 3-D shape.

It is this openness to interfacing with other software that is the nicest characteristic of The Complete Graphics System, and its author Mark Pelczarski is to be complimented. Not only does the purchaser of CGS receive a powerful graphics systems, but he receives a Hi-Res text generator and a color fill generator almost as bonuses.

So, I can recommend CGS to two class of users. First, for those on a very limited software budget, CGS has almost all of the capabilities available; this could result in a considerable cost savings. Second, this is a powerful package which should especially appeal to the determined experimenter. CGS is a treasure chest of potential, awaiting the intrepid explorer who will discover it.

**The Artist**

The Artist was introduced fairly recently and in some ways represents the state of the art with Apple graphics. From advertisements for The Artist, one gathers that it was first designed to help the software developers at On-Line with the production of graphic action games such as Crossfire, Threshold, Time Zone and Mouskattack. Thus, it is not surprising to find that the particular strengths of The Artist are in its abilities to create graphics for animation. In fact, three distinct ways of animating are included in the package.

The Artist package includes two disks and a friendly, clear manual. The main disk contains all of the routines used in creating graphics and shape tables. The utilities disk contains examples of animation and a variety of assembly language programs that may be used from the user's BASIC programs.

The main disk is strongly oriented around menus, and is quite easy to use, since few commands must be remembered. Although I have on occasion wished for a quick-reference card, I have rarely had much trouble figuring out how to carry out a procedure. All features are selected from a main menu, which appears on boot-up.

The first two options in the main menu are called Single Paddle Draw and Double Paddle Draw. Double Paddle Draw is an Etch-a-Sketch mode with one unusual feature. The line which is drawn may be of several widths from normal to about the width of two standard characters; the color of the line may be selected from the standard Hi-Res colors. Of course, there is a line plot option, which plots lines between user-specified end points. Otherwise, Double Paddle Draw shares all of the disadvantages of the Etch-a-Sketch mode; it is almost impossible to draw high quality curves.

Single Paddle Draw mode is, however, a feature unique to The Artist. In this mode, a V-shaped cursor is "driven" around the screen, controlled by a paddle; if the space bar has been pressed, the cursor will leave a line behind. The resulting curves are quite smooth. Although the method requires some practice to develop proficiency, this is a reasonable compromise between the accurate tedium of E-Z Draw and the fast sloppiness of an Etch-a-Sketch, and is my second most preferred drawing mode.

The Color Fill mode is, without qualification, the finest I have seen. While only 21 colors are available, compared to the 108 provided by CGS, the smoothness of the fill operation more than justifies my enthusiasm. When most color fill routines are used, it is almost always necessary to do some touchup. Remote corners in the fill area are missed and must be individually attended to. Well, I have tried hard to find a shape that The Artist cannot fill completely the first time; I have not been successful. The trade-off is that The Artist is a little slower than some other packages at performing fills; believe me, however, the extra time is well spent.

Color Fill has one other unique feature. If you have not left fill mode since a color was laid down, you can change it just by coloring the area again with the new color. To my knowledge, no other color fill routine allow one to recolor an area. There is simply nothing else like The Artist for color fill; in a program full of remarkable features, the Color Fill module may be the most remarkable.

Incidentally, although only 21 colors are provided, they are pretty well selected. I suspect that one will rarely lack for an appropriate color when using The Artist.

The Zoom Lens option allows one to inspect any area of the Hi-Res screen and to make changes on individual bits! The area to be worked on is selected by a window that may be moved anywhere on the screen. The window selects an area 28 dots wide and 35 dots high. This area is then displayed on the editing page.

In addition to presenting the area selected in its normal size, the editing page presents a graphic enlargement of the area selected, showing every dot in the appropriate color. By moving a cursor around on the screen, the user can turn any bit in the window on or off, including the color status bit, the bit that determines which color group the byte may contain. The process is easy, if a little tedious; after all, there are a lot of bits to be attended to.

The Zoom Lens may be used for several things. First, Hi-Res screens may be edited to correct small imperfections. Through judicious editing I have been able to fix some areas where incompatible colors had clashed. In fact, the Zoom Lens editor may be linked to the Color Fill routines. Alternate colors are created through various intricate patterns of dots, and this link assures that only the dots appropriate to a given color will turn on. Second, this is the easiest way I found to create highly detailed drawings. My first use of the Zoom Lens was to create a space creature which I then converted into a shape. Such creatures can involve complex pattern of dots which can interact in a variety of ways. With the Zoom Lens, one can easily see the ways the various dots and color bits fit together, since they are enlarged on the screen.

Other features in the Zoom Lens module include the abilities to shift pictures a dot at a time and to reverse the status of the color status bit either for the entire screen or for a small area.

The Artist can produce two types of shape tables. Conventional Apple shape tables are produced through a Scanning Mode routine. This mode has two interesting features. The user may specify the origin of the shape. Most scanning shape routines place the origin of the shape in the upper left corner; among the difficulties posed by this approach is that of rotating the shape around its center. Therefore, The Artist provides the option of locating the shape origin either at the corner or at the center of the shape. A second feature of interest is the Shape Maker's ability to cope with shapes that contain colors from both color groups. On request, two shapes will be created,

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each containing colors from one color group. Alternatively, if one shape is selected, colors will be rearranged so that only one color group is represented. A shape viewer is provided for the examination of shape tables.

In addition to Apple shape tables, The Artist can prepare special tables for use with high speed byte routines. These shapes are not compatible with standard Apple shape routines. Byte animation, the technique used to produce many of the fastest arcade games for the Apple, has been generally unavailable to the average programmer. By using shapes and routines provided with The Artist, however, arcade quality is made considerably easier to achieve.

Five assembly language drivers are provided to work with high speed shapes. Some incorporate collision detectors, making it easy to produce shoot-em-up type games. One incorporates a buffer on either side of the Hi-Res screen so that shapes may leave and reenter without messing up memory. Not surprisingly, the more powerful routines are also the slower ones. While the drivers may be used from BASIC—example programs in Applesoft are provided—I suspect that real speed will still require the calling routines to be written in assembler. Since the animation routines are often the most sophisticated parts of a game, however, this should be greatly simplify the programming required.

The Text module of The Artist is somewhat of a disappointment. Surprisingly, it does not permit either enlargement or rotation of text. The emphasis seems to be on character animation, a style of animation in which special characters are created to be animated with BASIC print commands. If you have seen Maxwell or Ribbit in the DOS Toolkit, you have seen character animation.

While it is possible to perform character animation with any Hi-Res character generator, it is nice to have a special editor that makes possible the creation of characters that will be printed in a block to create a large shape. DOS Toolkit contains an excellent font editor called Animatrix. The editor provided with The Artist, while a bit more tedious to use than Animatrix, contains some powerful features. Once a block of characters is defined, it may be shifted a dot at a time in any direction. Dots shifted out of one character will shift into the next character in the block. This permits smaller increments of motion as the characters are animated, providing smoother motion. It also requires that more printing be done.

This is the rub with character animation. It is effective only in fairly simple circumstances, since the speed of motion is directly related to the speed with which characters may be printed by the Apple. When only one or two shapes are animated, the results can be quite nice.

In the example provided with The Artist, an invaders game is presented in Applesoft using character animation. Even compiled with On-Line's Expediter the result is rather too slow. So, the rule with character animation is to keep the manipulations simple. An excellent tutorial in character animation is provided with The Artist, in which the development of the invaders game is described in great detail. Even if the game is slow, it illustrates the principles involved quite well.

The documentation provided with The Artist is quite extensive—about 130 pages. It is well written and clear without being condescending, and while humor is present, it does not obscure the instructions. Good discussions of character animation (20 pages) and Hi-Res graphics in general (including the reprints of Ken's articles) make this manual a very valuable one.

I have one complaint on the technical implementation. In certain circumstances, the paddles are asked to provide more critical readings than they often can produce. In the font editor, one paddle moves a cursor around to select which of the 255 characters is to be edited. Readings from my paddles often vary by one or two points, and selecting a letter in this way can involve a lot of adjustment before the reading settles down. Since I suspect that many users have paddles that are equally unstable, it might be wise to incorporate some means whereby characters might be selected from the keyboard.

The Artist is an interesting package. If it had a better text module, it would be even more interesting. As it is, if you want the best in color fill and animation, The Artist appears to be the current program of choice.

## Conclusions

So, if I sum up by biases and reactions, where do I end up? First let me capsulize my feelings about the strengths of each package.

Higher Graphics is the most powerful tool available for the manipulation of shape tables. It's text module, while it lacks exotic fonts, allows great freedom of text placement. It is very economical, works with Integer and Applesoft, and would probably be all the occasional user needs to own.

E-Z Draw is very easy to use, and has convinced me that other graphics packages are too dependent on game paddles. The 100% keyboard control of E-Z Draw allows great precision and eliminates the need to continually put down and pick up the paddles.

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E-Z Draw has the best text going. Although it does not have shape routines, the user can perform many unique screen manipulations. E-Z Draw is great for the occasional user, since the commands are easy to remember and quickly become almost automatic.

The Complete Graphics System is comprehensive and will do just about anything. It has a good text module, a very good shape creator, and excellent abilities with 3-D graphics. Many of its modules are usable under control of outside programs. CGS is a bargain, even if it is the second most expensive program. If one does not already own a text generator and a shape maker, the cost of CGS becomes quite reasonable.

The Artist, like E-Z Draw, lacks some features that make it a complete graphics production package. Almost every feature The Artist has, however, is excellent. In color fill and animation support, The Artist is the best package of which I am aware. The Zoom Lens feature is a powerful tool, usable in a variety of graphics operations. Single paddle drawing is my second preferred way to draw curves. Considerable support is provided in the form of demonstration programs and utilities.

Looking at the last four paragraphs, no one package emerges as clearly superior. Each has strengths, failings, and omissions.

You may find it desirable to purchase two or more graphics packages in order to get all of the features you want. If this seems extravagant, consider that all four packages together list for about $235. A Versawriter lists for $299 and, with the exception of its drawing capability, does not come even close to the combined abilities of the programs. In fact, almost every feature of Versawriter may be topped by one of the packages I have reviewed. Even if I did own a Versawriter, I would probably not use it except to create line drawings. I hope that the folks at Versa Computing are listening; Versawriter is a very nice piece of hardware, but the software badly needs updating.

In any case, for $35 to $100 you can own some significant graphics potential. Each of these packages will probably prove satisfactory, provided you buy it knowing its limitations. If you like graphics, if you bought your Apple because it was an outstanding graphics machine, you owe it to yourself to buy one of these programs.


## AMPERGRAPH

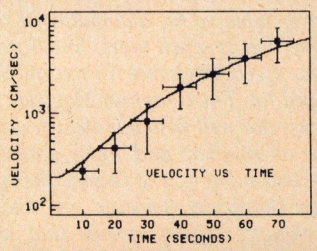
AMPERGRAPH is a powerful, easy-to-use graphics utility for the Apple II Plus. AMPERGRAPH adds twenty-two Applesoft commands that allow effortless generation of professional-looking plots of scientific or financial data. All of the necessary scaling and screen formatting is accomplished with just a few, simple Applesoft lines.

Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentype printer) and &*DUMP (to link with AMPERDUMP, see below).

AMPERGRAPH uses the Applesoft ampersand machine language jump vector to link to a relocatable 9K routine which normally resides above the second page of high-resolution graphics in the Apple II Plus.

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
   (CM/SEC)"
20 &LOG Y:&LABEL AXES, 10, 10
25 LABEL$ = "VELOCITY VS. TIME":&LABEL, 30,
   200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T12:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
   (150 + T12)*(.8 + .4*RND(3) )
45 &ERROR BARS, 5, T12/2
50 NEXT T:&DUMP
```




## AMPERDUMP

AMPERDUMP is a high-resolution graphics dump utility which was written specifically to take advantage of the graphics features of the Epson MX-80 and MX-100 printers (MX-80 must have the Graftrax conversion). AMPERDUMP offers many features which are not available in other graphics dump routines:

- Three horizontal magnifications (2.33, 4.66 and 6.99 inches wide)
- Nine vertical magnifications with the MX-80 (0.88, 1.77, 2.64, 3.78, 4.25, 4.45, 5.31, 5.87, and 7.96 inches high); and three vertical magnifications with the MX-100 (2.64, 5.31, and 7.96 inches high)
- Horizontal and vertical magnifications can be specified independently to produce 27 different plot size formats with the MX-80, and 9 different formats with the MX-100
- Normal / Inverse dumps
- Fast
- Adjustable horizontal tab
- Easy to use
- Compatible with AMPERGRAPH
- Relocatable

The AMPERGRAPH and AMPERDUMP graphics utilities require and Apple II Plus (or Apple II with language card) with 48K and DOS 3.3. The AMPERDUMP utility requires and Epson MX-80 with Graftrax, or an MX-100, and one of the following interface cards: Epson, Apple, Grappler, Interactive Structures, or Mountain Computer.

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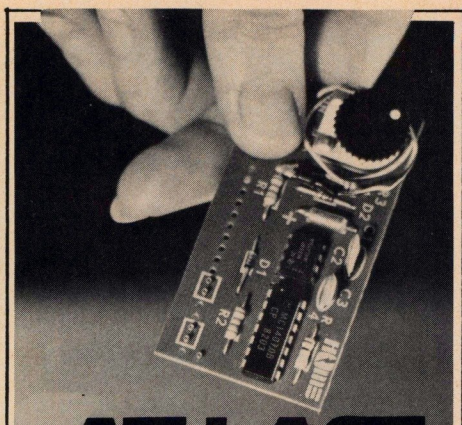

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# PENGUIN RESPONDS TO CHAMPAGNE GRAPHICS

*The reviews are very good, but we continually update our software and the original version of Complete Graphics System from May 1981 (the one reviewed) has undergone several updates based on feedback we've received from our customers. Software writing can be quite an interactive art. No one person has all the right approaches, and it's fun to have somewhat of a dialog with people who use what we write. We've taken a lot of suggestions that sounded neat and added them to our graphics packages, and as a result keep them quite current. And we've always provided those who've bought previous versions with updates for your cost of a new disk and shipping ($5).*

*Of the larger changes to Complete Graphics System, we've now put all 108 colors on a single screen palette for easier selection, and we've replaced the automatic fill routine with one that is much more "intelligent" at the same speed. (the same fill routine that we developed for The Graphics Magician.) The text generator will now handle any size text, 14x16, or smaller, and we've added commands that allow you to change the spacing between characters however you like. The other changes regard options that weren't addressed in the review, but I'd like to note that in the option choices throughout the programs we use single letter commands, such as "L" for line, "C" for color, and so on. The options available are always displayed on the bottom of the screen. Andrew seemed to have some trouble with this, but once you use it a few times, the single letter prompts at the bottom of the screen are easy to use. As he did point out, there is also a reference card for some of the less frequently used options.*

*I'm surprised that Complete Graphics System was compared to On-Line's Artist package. The Complete Graphics System was written more for non-programmers. The Graphics Magician is the more likely package to look at side by side with The Artist. We wrote that one strictly for programmers who want to put animation and Hi-Res pictures into their own software. It's all menu-driven, and allows you to draw multi-colored shapes, draw paths, and combine them in an animation editor that allows four kinds of animation. The resulting machine language code can be CALLed from your own BASIC or machine language program to perform all the animation functions. We also include a tutorial that shows how to control figures with joystick or keyboard, how to detect collisions and change shapes, and a bunch more. Graphics Magician also has a picture on disk. Andrew referred to the technique in his review but Magician is much better for doing this than Complete Graphics System. The way it works is as you draw, the computer keeps track of your moves, such as "Line," "Fill," "Brush," etc. You can edit your moves however you want, such as by deleting the last thing you did if you didn't like it or made a mistake. A routine called PIC-DRAW lets you reassemble your picture from any other program.*

*The last note concerns copy-protection.* Call - A.P.P.L.E. *published the original announcement last winter about us removing the protection from all our applications products. To keep everyone up to date, the results have been excellent! We've actually* increased *sales, something that even exceeded my expectations (I was hoping they'd stay level). We constantly have people thanking us for trusting them and letting them use the software to the fullest. We even have people call who say they have traded software with friends, but refuse to do so with our products because of our policies. I'd have felt really good had sales stayed about the same; the increase is just a bonus. Our thanks to all of you!*

## On-Line Responds

Thank you for giving us the opportunity to comment on your review of "The Artist". To clarify the problem noted in using "Font Editor", if you use a Control K you go to keyboard mode and can position the cursor exactly on top of the desired character. Then the cursor is moved one character at a time. Control P takes you out of this mode and back to the paddles.

We have just this month increased the documentation by including three new chapters on graphics by Ken Williams. By following these, the user can increase his skill and enjoyment of "The Artist".

We consider this article to be fair and impartial. Again, thank you for a favorable review.

# The Pizza Program

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Want to go out to your favorite restaurant? Enter the restaurant's name as a "Main Course." Now your computer will automatically remind you to go out to eat — and as often as you select. It will delete all other items from that meal except the name of the restaurant.

### AUTOMATIC SHOPPING LIST

You get a new menu each week or for just a few days if you want. And, it generates a detailed shopping list, automatically. It can arrange each item on the list in sequence according to the aisles at your favorite store. Studies show a shopping list will discourage impulse buying and save you money.

Also, it generates a per serving calorie counter. This is easy to delete anytime you are not in a diet mood or want to celebrate for any reason. You never count calories unless you want to.

### RANDOMLY DELICIOUS

Say goodby to boring meals. Your computer will remember variety is the spice of life. This system makes eating at home a pleasure again. Each menu is randomly generated from major food groups according to the specific criteria you select. The system is easy to learn and easy to operate. Yet it is a sophisticated piece of software which will prevent menu mix-ups.

It will add a new dimension to your home meals without increasing your food costs. It is rumored The Pizza Program may actually reduce the climbing divorce rate. Husbands now have something to look forward to for dinner. Wives think it is terrific because it saves time and effort. And, kids love anything computerized. This is a useful and practical application you'll appreciate day after day, week after week.

### TRY IT FOR 30 DAYS WITHOUT RISK

This tested system is guaranteed to make your life easier and happier. Our home trial lets you actually use The Pizza Program for a full 30 days before you decide to keep it. Watch the fun and convenience it creates. Enjoy better meals and see how much time it saves. If you are not satisfied for any reason, return it within 1 month for a prompt and courteous refund. Your investment is just $34.50 plus $2.00 for shipping and handling. (California residents add 6½% sales tax.) Full documentation is included.

### OUT OF THE RUT

One housewife's reaction to this program is typical. She wrote, "Before using your system I found myself getting into a rut of serving the same things over and over. The Pizza Program has changed all of this for me. We now have a wider variety of dinners and best of all I don't have to decide what they will be. If this was all it did, I'd be thrilled. But it isn't. The shopping list I receive along with my menus has been such a time saver. I quickly run through it and delete anything I feel I don't need and add something I might. I would have a hard time going back to doing my menus by hand."

This system requires an Apple II Plus* with 48K and 1 disk drive. We urge you to take advantage of our no-risk, 30 day home trial offer. To order call toll free and use your VISA or MasterCard. Or, send a check to the address below. There's no obligation. Order today.

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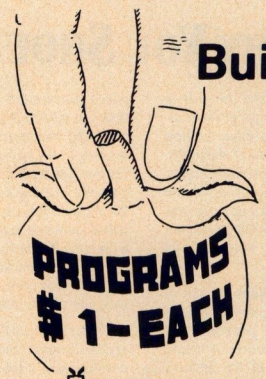


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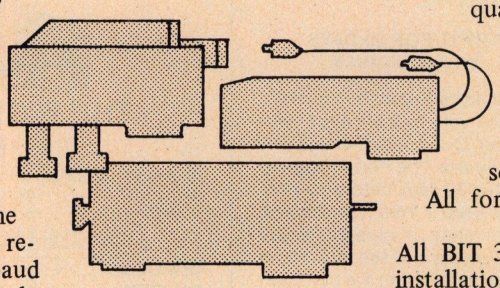

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We've spent a lot of time and money in the last year in developing the first and finest nibble copy program available, and in continually improving it to combat the new methods of copy protection appearing almost daily. Oh, LOCKSMITH™ 4.1 also has a nibble editor, bulk eraser, INSPECTOR™ interface, and disk speed test program, but the *real* reason to buy LOCKSMITH is to back up programs which are important enough so that you can't be without them, when the software manufacturer won't provide adequate service.

As we've told you before, archive backups are not in violation of an author's copyright, as long as you are the authorized owner of the original of the program. But copying of a program to sell to an aquaintance, or to give to a friend, is clearly an infringement of the author's copyright. Use LOCKSMITH for the first purpose, but don't use it for the second.

This advice is not, as some have suggested, merely a subterfuge with our fingers crossed behind our backs. . .a subtle signal to potential purchasers to buy LOCKSMITH to begin a career of formal, largescale piracy, or just an informal, small scale barter club. DON'T use LOCKSMITH either for piracy or the barter club, and here's why.

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So don't buy LOCKSMITH for piracy, but only to make archive copies. But we'll go even further. We think it doesn't make a lot of sense to buy LOCKSMITH to make archive copies of any program which is published with a reasonable backup policy. If a backup is included with the original disk, and no-fault replacements are available at nominal cost, why spend $100 to purchase LOCKSMITH? If a company is charging $5 per copy for a replacement disk (we charge $3, for LOCKSMITH) it takes a lot of blown disks to make up the $100 LOCKSMITH price. Probably more than you'll ever have.

As far as games are concerned, the better manufacturers are coming out with inexpensive replacement disks, also. And while the tendency is to not supply 2 disks with a package, we doubt that a game can be so important to you that being without it for a week is really a matter of life and death. So if the games that you buy have reasonable replacement policies, (even if an immediate backup is not supplied) don't buy LOCKSMITH for them, either.

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There you have it. We suggest that you DON'T BUY LOCKSMITH if the publishers of the programs that you do buy are reasonable about their policies. We're so convinced about this, that effective immediately, we will no longer support parm listings for programs which are sold with reasonable replacement policies. As there is no industry standard, at the moment, we've invited some other interested parties to meet with us to discuss setting up standards. For the time being we will define "reasonable" as requiring a backup disk to be included free with the package for business and utility software, (but not for games) and blown (original) disk for new disk replacement for $5.00 (including postage) or less, for both games and business programs. Thus, with this new policy, you will no longer have our help to backup disks for programs complying with these policies, and therefore LOCKSMITH will not be very helpful to you, for such programs.

What will happen if ALL software publishers decided to adhere to these standards? In that case, we'd be out of the LOCKSMITH business. But that wouldn't bother us, particularly, because that would mean that the industry had taken a great step forward. In the meantime, if you have a program without backup, that is vital to your business, or have spent $40 for a game that the manufacturer refuses to even think of selling replacements for, ask for LOCKSMITH™ 4.1. Because at the moment, it is clear to us that most of you DO need LOCKSMITH.

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A HIGHER TEXT APPLE-CATION:

# CONFESSIONS OF A COMPUTER JUNKIE

Donal Buchanan

I'D been wanting a computer for over thirty years. It wasn't something I talked about or even (most of the time) was consciously aware of, but the desire was there. I remember, back in the forties, seeing those ads in *Astounding SF* (long before it became *Analog*) "Own your own Computer! only $19.95" (or something along that line). I drooled, but never bit. Something told me that all I'd get at that price would be some kind of mechanical hand calculator—and that wasn't what I wanted. Lets face it. I wanted UNIVAC! Like many another poor soul, I subdued my dream and decided to live in the real world.

Another memory climbs out of the dust. Several years back, my son, Martin, The Great Programmer, decided to build his own home computer. He gave up after awhile, not (I think) because he was then more experienced with software rather than hardware (which was true) but because he could see that there would shortly come on the market better home computers than he could hope to build. Nevertheless, I followed his progress eagerly—even helping him a bit. Not with the hard stuff, of course. It was just that he had purchased an ancient terminal that had a loose board. I knew just how to hit the dumb thing (that's the kind it was) to make it work. Not scientific, I grant you; but it makes you feel like an Engineer!

Then one day he needed a part and we piled into the car and took off for one of the few computer stores in the area: a little hole in the wall on the second floor of a distant shopping mall. There I was introduced to Star Trek, computer style. It didn't matter that I could only nail a Klingon with help and got myself lost in intergalactic space. I was absolutely hooked. My old dream came back full force.

I didn't get a chance to do anything about it until 1978, two years after retiring from my Government job. By that time PET had come along. I bought a PET 2001 and began to learn Microsoft Basic. The Great Programmer (and that is *not* sarcasm) had departed on a life program of his own. Fortunately, however, another, equally good programmer chose to rent a room from us. *He* owned an OSI he'd put together himself. So we became a two computer household. He was dissatisfied with his OSI at that point because there was so little software or hardware available. I soon found the same problem with my PET. Those were the days when Commodore was just barely supporting what was really a very good product. Jim (the OSI owner) and I both used to look at the Apples in the stores and drool. Color! My, oh, my! Wouldn't that be great to have? Real high resolution graphics! Being artistically inclined, this really impressed me. Oh, it wasn't Tectronics, but...

Jim was a godsend. The kind of programs I wanted, nobody was writing. Cryptography programs, for instance. Oh, there were simple substitution programs available—but no programs that really helped you *break* a cipher. He wrote a dandy, following my wantlist to the letter. It does all the donkey work in breaking a simple substitution cipher and leaves the brainwork to you. Subsequently, with his help, I wrote a program that would encipher using Playfair and another that used a foursquare or twosquare checkerboard. What a great feeling it is to write lines of BASIC and then find out they *work!*

About a year after buying my PET I sold it and took the big step: I bought an Apple. My fate was sealed. I began to buy every magazine that came out that had the word computer anywhere in it. I became a sucker for anything new that came out (anyone want a barely used Supertalker?). Hardware, software, if it was for Apple, chances are I had it or wanted it. I even sold computers for awhile for a local computer store. I wasn't much of a salesman, but could convey my enthusiasm for the product, which helped.

My system has grown since then to encompass 64k, two drives, Pascal, the Z-80 card, a modem, a Graphics Tablet, and a NEC 5520 printer. I tell myself that now I'm no longer a junkie—that I can quit anytime; but still, I need that fix—a visit to the local Computerland every day or so—I might *miss something!*

My first use of my computer involved a lot of game playing. Adventure games became a specialty and Scott Adams my hero (he won't remember it, but I shook his hand and spoke to him a bit once at a show at the D.C. Armory—a thrill at least equal to when I actually got to meet Steve Wozniak a few months ago). Serious uses soon developed, however: Wordprocessing (an unsold novel and several articles—including this one; also the church newsletter); Finance (my checkbook is on Visicalc—and so is my church's budget); Mailing List (the church directory and the directory of a local archaeological society). Using The Source, I've "chatted" with new friends in Ohio and Texas. There is really no end to the usefulness of this critter!

Still, folks weren't writing the programs I needed—and they still aren't. After retirement, I became deeply involved in the investigation of ancient Iberic inscriptions (from Spain, dated c.400-0 B.C.). There had to be a way for the computer to make things easier. I began to investigate Hi-Res character generators, even investing in a Romplus+ board. The latter *is* a good buy, but I finally concluded that the best Hi-Res character generator out was *Higher Text.* Using *Higher Text*, I came up with a Punic font (you can find it on the Higher Fonts disk). I became aware of *Linguist.* It turned out to be very close to the kind of thing I needed, if I could get it to use the fonts *I* wanted to use. Bob Clardy of Synergistics was extremely helpful and sent me a *Linguist* disk with Punic added. By that time, however, I'd concluded that the Punic font, as it stood, couldn't cut it; so I came up with another that I call Iberic, but which could be used for Etruscan or even ancient Greek. —◉→

# CONFESSIONS OF A COMPUTER JUNKIE

Further, I needed a means to print out inscriptions, with transliterations (sometimes in another script, like Hebrew or Arabic) and translations. To do this, I wrote Inscription Writer, which is listed here, with a lot of help from my friends. The program results in a screenful of info which can be saved as a file to be printed using the Computer Station Graphics diskette, and no doubt some of the other graphics dump programs. It is slow, cumbersome, and I'm sure there are many programmers out there who could do the same thing in one page, but by golly, *it works!*

Be warned! This program calls HIGHER TEXT and LOMEM: (therefore they should be included on your disk; consult your Higher Text manual). You may want to incorporate the Hello program into the beginning of your main program. I did not choose to do so. Also, whatever fonts you decide to use, one of them *must* be Small Fonts.F (from the Higher Text disk).

I learned a lot writing this program. As I was trying to idiot-proof it (hard, when the principal idiot is doing the writing), I discovered that as a result of earlier fixes, B$ was not being properly cleaned out of control characters and numerals by the subroutine at 8110. After days of banging my head against the wall, I concluded it was simpler to treat the symptoms than the disease. A few lines aimed at B$ after it went through the subroutine did the trick.

I learned about flags—how useful they could be. *And* got lessons in thinking logically as I tried to follow the sometimes twisted logic that caused me to set up the flags in the first place!

I learned to relax and turn a hard problem over to my subconscious. Sometimes lightning would strike at the most peculiar times. Driving home late one night, I had a Eureka. Apparently my subC had been mumbling all along: "For I = 1 to N...," etc.. This happened enough times for it to become almost routine. Such Eurekas aren't always right, but they are usually in the right direction.

My programming is of the thud-and-blunder type (if it works, leave it alone; if it doesn't work, keep trying things until it does). Still, I hope that you enjoy my offering. I enjoyed writing it.

Now, folks, Linguist is *good,* but what I could really use is a word-processor that would permit the use of alternate fonts so that an inscription could be *incorporated* into a paragraph of text (if such a fix could work with Supertext II, so much the better). And I could use a database that displays and operates like Visicalc (63 columns by 255 rows; column-width can be altered between 3 and 15 characters) that could be sorted by row or column and searched *and* accept unusual fonts (so that a column of Iberic could stand next to a column of Hebrew followed by a column of Arabic—if that's what I wanted). In other words, an easy way to construct a comparative dictionary.

Anybody out there feel challenged?

```
]LIST

10  REM

INSCRIPTION WRITER

BY DONAL B. BUCHANAN

WITH KIND HELP FROM CHRIS
WILLIAMSON, BOB CLARDY OF
SYNERGISTICS; CHUCK, DAVE, MIKE
OF OUR FINE LOCAL COMPUTERLAND

CALL -A.P.P.L.E. : NOV. 1982

100  PRINT  CHR$ (4)"BRUN LOMEM:"
     : &  LOMEM: 16384
110  PRINT  CHR$ (4)"BRUN HIGHER
     TEXT"
210  PRINT  CHR$ (12)
310  VTAB 10
410  HTAB 10
510  PRINT "
           INSCRIPTION WRITER
                              "
610  PRINT
620  PRINT
710  HTAB 18: PRINT "By"
810  PRINT
910  HTAB 12: PRINT "Donal Buchan
     an"
1010 X =  PEEK ( - 16384): IF X <
     128 THEN 1010
1020  POKE  - 16368,0
1115 X = 0
1120  PRINT  CHR$ (12)
1125  VTAB 4: HTAB 14: PRINT "INS
     TRUCTIONS"
1130  PRINT
1135  PRINT "     This program is
      designed to permit"
1140  PRINT "you to input inscrip
      tions and to save"
1145  PRINT "them for later print
      ing on a printer"
1150  PRINT "such as use Computer
      Station Graphic"
1155  PRINT "disks.  When asked f
      or the font, you"
1160  PRINT "may type 'C' to see
      the catalog or hit"
1165  PRINT "return if font is al
      ready in."
1167  PRINT
1170  PRINT "To shift subfonts ty
      pe shift-control-"
1175  PRINT "M and then a number:
      1 = regular; 2 ="
1180  PRINT "subfont 2; 3 = subfo
      nt 3; 4 = medium"
1182  PRINT "or large font. 5 = U
      nassigned."
1184  PRINT
1185  PRINT "DON'T HIT RETURN unt
      il you have"
1190  PRINT "finished your input.
      "
1193  PRINT : PRINT
1195  HTAB 15: PRINT "
                    GOOD LUCK!
                                "

1200 X =  PEEK ( - 16384): IF X <
     128 THEN 1200
1205  POKE  - 16368,0
1208 X = 0
1210  PRINT  CHR$ (12)
1310 F$ = "":A$ = "":B$ = "":C$ =
     ""
1312 FF$ = "":G$ = "":H$ = ""
```

```
1350 H$ = "SMALL FONTS.F"
1410  VTAB 20
1510  INPUT "Which Font?";F$
1610  IF  LEN (F$) > 2 THEN 2010
1710  IF F$ = "" THEN 2110
1810  IF F$ = "C" THEN  PRINT  CHR$
     (4)"CATALOG"
1910  GET R$: IF R$ THEN 1210
2010  VTAB 20: HTAB 1: PRINT "Typ
     e in inscription          "
2020  PRINT "when screen clears."

2110  PRINT  CHR$ (4)"BLOAD";F$
2200 W = 0:V = 0
2210  FOR I = 1 TO 1000: NEXT I
2220 IN$ = ""
2310  PRINT  CHR$ (12)
2410  GET IN$
2510  IF  ASC (IN$) = 13 THEN U =
     1
2520  IF V = 0 AND U = 1 THEN 291
     2
2610  PRINT IN$;
2620 I$ = IN$
2710  GOSUB 9310
2720 IN$ = I$
2730 I$ = ""
2810 A$ = A$ + IN$
2910  GOTO 2410
2911 B$ = ""
2912  IF  RIGHT$ (F$,2) (  ) "LF"
      THEN 2920
2915  PRINT
2916  PRINT  CHR$ (4)"BLOAD";H$
2917  PRINT
2920  PRINT  CHR$ (12)
2925 U = 0
2927 T = 0
2930  VTAB 20: HTAB 1: INPUT "Ano
     ther Font?";AF$
2940  IF  LEFT$ (AF$,1) (  ) "Y" THEN
     3010
2950  PRINT  CHR$ (12): VTAB 20
2960  INPUT "Which Font?";FF$
2970  IF  LEN (FF$) > 2 THEN 2994

2975  IF FF$ = "" THEN 3010
2980  IF FF$ = "C" THEN  PRINT  CHR$
     (4)"CATALOG"
2990  GET R$: IF R$ THEN 2950
2994  VTAB 20: HTAB 1: PRINT "Typ
     e in Transliteration      "
     : PRINT "when screen clears.
     "
2995  PRINT  CHR$ (4)"BLOAD";FF$
2996 W = 1
2997  IF  RIGHT$ (FF$,2) = "SM" THEN
     T = 1: IF  RIGHT$ (FF$,2) =
     "SF" THEN T = 1
2998  FOR I = 1 TO 1000: NEXT I
2999 SC$ = ""
3000  GOTO 3210
3010  VTAB 20: HTAB 1: PRINT "Typ
     e in Transliteration      "
     : PRINT "when screen clears.
     "
3020 V = 1
3025 SC$ = ""
3110  FOR I = 1 TO 1000: NEXT I
3210  PRINT  CHR$ (12)
3250 S$ = "":I$ = ""
3255 B$ = ""
3260 SC$ = ""
3310  GET SC$
3320  IF  ASC (SC$) = 13 THEN U =
     1
3410  IF V = 1 AND U = 1 THEN 390
     0
3420  IF W = 1 AND U = 1 THEN 390
     0
3510  PRINT SC$;
3520 I$ = SC$
3610  GOSUB 9310
3620 SC$ = I$
3630 I$ = ""
3710 B$ = B$ + SC$
3810  GOTO 3310
3900  PRINT
3905  GOSUB 10250
3910  IF W = 1 THEN  PRINT  CHR$
     (18)
4000  VTAB 20: HTAB 1: PRINT "Typ
     e in Translation       ": PRINT
     "when screen clears."
4010  FOR I = 1 TO 1000: NEXT I
4110  PRINT  CHR$ (12)
4120 RI$ = ""
4130 U = 0
4210  GET RI$
4220  IF  ASC (RI$) = 13 THEN U =
     1
4310  IF U = 1 THEN 4710
4410  PRINT RI$;
4510 C$ = C$ + RI$
4610  GOTO 4210
4710  PRINT
4712  PRINT  CHR$ (4)"BLOAD";F$
4713  PRINT
4715  PRINT  CHR$ (12)
4720 U = 0
4810 N =  LEN (A$)
4910  FOR I = 1 TO N
5010 Y = 0
5110 PT$ =  MID$ (A$,I,1)
5120 I$ = PT$
5210  GOSUB 8110
5310  IF Y = 1 THEN 5710
5410  IF X = 1 THEN 5710
5510  IF Z = 1 THEN I$ = ""
5520 CH =  PEEK (36)
5525  IF CH = 39 THEN  PRINT : PRINT
     : POKE 36,0
5550 PT$ = I$
5610  PRINT PT$;
5710  NEXT I
5810  PRINT
5900  PRINT
6000  IF W = 0 THEN 6010
6004  PRINT
6005  PRINT  CHR$ (4)"BLOAD";FF$
6006  PRINT
6007  IF T = 1 THEN  PRINT  CHR$
     (18): GOTO 6010
6009  IF W = 1 THEN  PRINT  CHR$
     (17)
6010 N =  LEN (B$)
6110  FOR I = 1 TO N
6210 Y = 0
6310 IO$ =  MID$ (B$,I,1)
6320 I$ = IO$
6410  GOSUB 8110
6510  IF Y = 1 THEN 6910
6610  IF X = 1 THEN 6910
6710  IF Z = 1 THEN I$ = ""
6720 CH =  PEEK (36)
6725  IF CH = 39 THEN  PRINT : PRINT
     : POKE 36,0
6750 IO$ = I$
6754  IF V = 1 THEN 6810
6755  IF IO$ =  CHR$ (29) THEN IO
     $ = ""
6775  IF IO$ = "1" AND  MID$ (B$,
     I - 1,1) =  CHR$ (29) THEN I
     O$ = ""
6780  IF IO$ = "2" AND  MID$ (B$,
     I - 1,1) =  CHR$ (29) THEN I
     O$ = ""
6783  IF IO$ = "3" AND  MID$ (B$,
     I - 1,1) =  CHR$ (29) THEN I
     O$ = ""
```

# CONFESSIONS OF A COMPUTER JUNKIE

```
6785  IF IO$ = "4" AND MID$ (B$,
      I - 1,1) = CHR$ (29) THEN I
      O$ = ""
6790  IF IO$ = "5" AND MID$ (B$,
      I - 1,1) = CHR$ (29) THEN I
      O$ = ""
6810  PRINT IO$;
6910  NEXT I
6920  PRINT
7000  GOSUB 10250
7005  IF W = 1 THEN PRINT CHR$
      (18)
7010  PRINT
7110  PRINT
7310  PRINT C$
7410  VTAB 23
7510  INPUT "Save?";N$
7610  IF LEFT$ (N$,1) ( ) "Y" THEN
      END
7710  VTAB 23
7810  INPUT "Filename?";G$
7910  PRINT CHR$ (4)"BSAVE";G$;"
      ,A$2000,L$2000"
8010  GOTO 10310
8110  REM SECOND SHIFT FONT GOSU
      B
8210  Z = 0
8310  IF I$ = CHR$ (29) THEN X =
      1
8410  IF I$ = CHR$ (29) THEN Y =
      1
8510  IF Y = 1 THEN RETURN
8610  IF X = 0 THEN RETURN
8710  IF I$ = "1" THEN PRINT CHR$
      (18);: POKE 772,28
8810  IF I$ = "2" THEN PRINT CHR$
      (18);: POKE 772,24
8910  IF I$ = "3" THEN PRINT CHR$
      (18);: POKE 772,20
8920  IF I$ = "4" THEN PRINT CHR$
      (17);: POKE 771,16
8930  IF I$ = "5" THEN PRINT CHR$
      (17);: POKE 771,60
9010  Z = 1
9110  X = 0
9210  RETURN
9310  REM SHIFT FONT GOSUB
9320  S$ = ""
9410  IF I$ ( ) CHR$ (29) THEN
      RETURN
9510  IF I$ = CHR$ (29) THEN GET
      S$
9610  IF S$ = "1" THEN PRINT CHR$
      (18);: POKE 772,28
9710  IF S$ = "2" THEN PRINT CHR$
      (18);: POKE 772,24
9810  IF S$ = "3" THEN PRINT CHR$
      (18);: POKE 772,20
9820  IF S$ = "4" THEN PRINT CHR$
      (17);: POKE 772,16
9830  IF S$ = "5" THEN PRINT CHR$
      (17);: POKE 772,60
9900  IF T = 1 OR V = 1 OR W = 1 THEN
      PRINT I$;:B$ = B$ + I$
9905  IF T = 1 OR V = 1 OR W = 1 THEN
      PRINT S$;:B$ = B$ + S$
9910  IF T = 1 OR V = 1 OR W = 1 THEN
      3310
9915  PRINT I$;:A$ = A$ + I$
10010  PRINT S$;:A$ = A$ + S$
10120  IF W = 0 OR V = 0 THEN 241
      0
10210  RETURN
10250  IF W = 0 THEN RETURN
10255  PRINT CHR$ (4)"BLOAD";H$
10260  RETURN
10310  END
```


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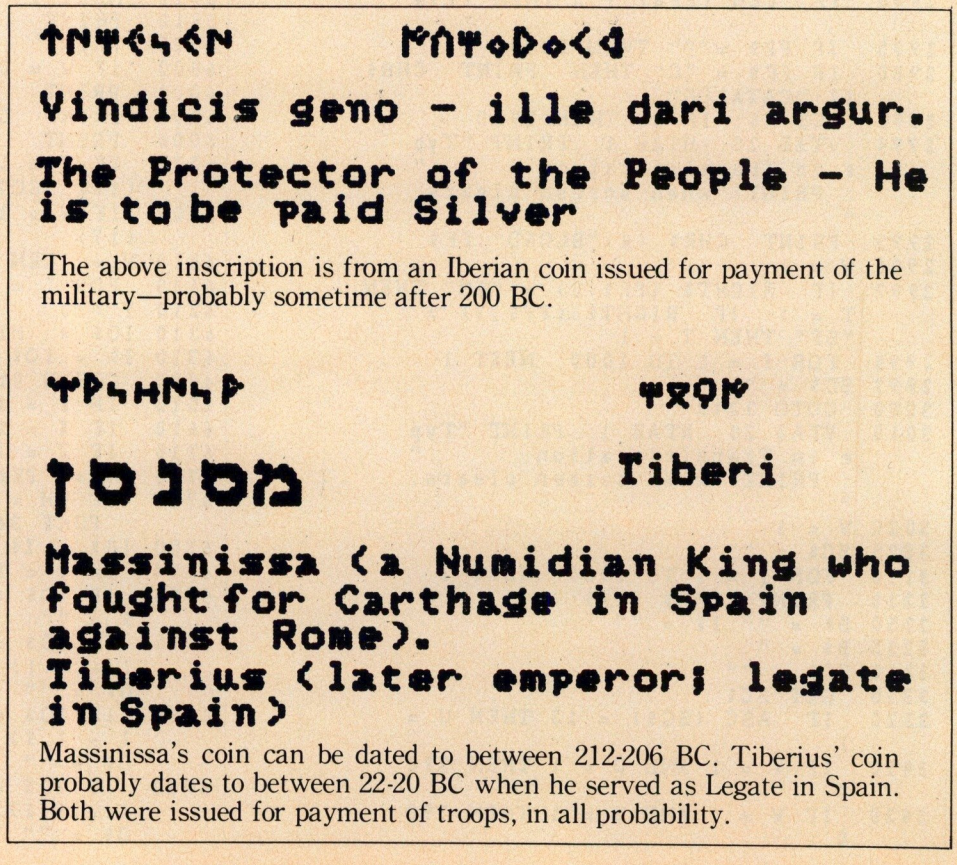


The above inscription is from an Iberian coin issued for payment of the military—probably sometime after 200 BC.

Massinissa's coin can be dated to between 212-206 BC. Tiberius' coin probably dates to between 22-20 BC when he served as Legate in Spain. Both were issued for payment of troops, in all probability.

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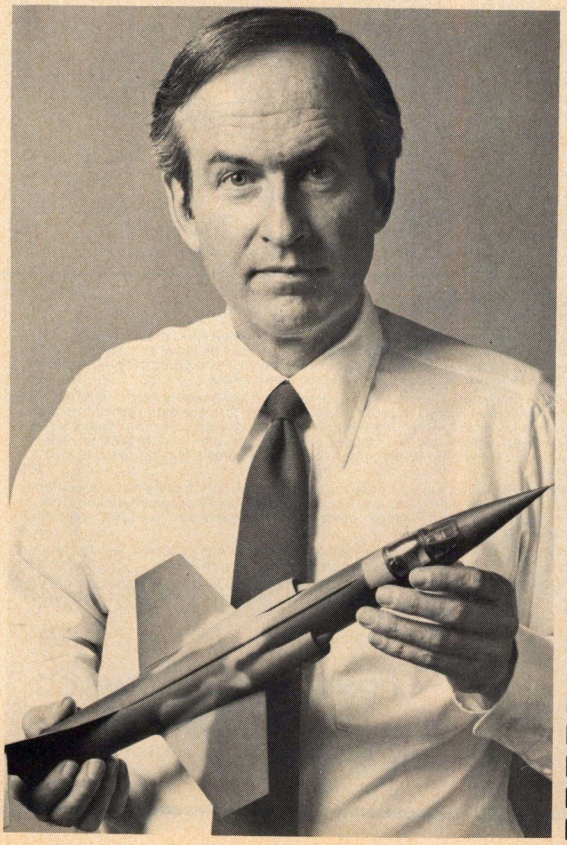

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# GRAPHIC GARBAGE COLLECTION

Richard Cornelius/Melvin Zandler/Wichita State University

GARBAGE collection is a procedure undertaken by the Applesoft interpreter to rearrange the storage space for string variables. The idea of garbage collection is such an abstract concept that we thought it might be more easily understood on the basis of a concrete demonstration. This article discusses the why and how of garbage collection and describes a program which shows garbage collection actually taking place on the Apple's high-resolution graphics screen. We learned a great deal by writing the program, and we hope that others can learn by running it. Before describing the program, we first present a review of the manner in which variables are stored in the Apple as a background for understanding the program.

## Variable Storage

The text of an Applesoft program lies near the bottom of the memory of the computer. Numeric variables are stored in memory just above the program text. The space that is occupied by a numeric variable (7 bytes) is independent of the value or type of that variable. Above the region for numeric variables comes the area allocated for array variables, if the program has any arrays defined. If these array variables are numeric, then the variable values themselves occupy this region. If the variables or variable arrays are string variables, then the *pointers* that record where the actual string definitions are located lie in this part of memory. The characters that make up the definitions of string variables start at the top of memory and build downward toward the array space as more strings are defined. If a string variable is redefined, the new characters may not fit into the old spot, so Applesoft picks a new spot at the bottom of the string storage area to store the newly defined string variable and changes the pointer for that variable to point to the new string definition. The memory space occupied by the old definition of that string variable becomes wasted space. If a sufficient number of string variables are redefined, the computer may run out of space to put the new string definitions while much space is wasted with useless old string definitions. (See Clay Ruth's "Weed Out the Trash", elsewhere in this issue.)

When Applesoft runs out of space, it collects the "garbage," i.e., the old string definitions. It sorts through all of the string variables in memory and uses the pointers to move all of the active string definitions up to the top of memory, thereby freeing space for reuse.

Many programs that use string variables will have garbage collection occur while the program is running. If only a few strings are defined, garbage collection occurs so quickly that it is never noticed. If a very large number of strings are defined, garbage collection can require several minutes. Although normal operation of the program is interrupted, a lengthy delay does not shed much light on the process that is occurring. As a result, a text-oriented sample program is not helpful for teaching purposes. To better illustrate what is happening, we have written the accompanying program which actually shows the process of garbage collection in action on the computer's high-resolution graphics screen. The remainder of the article mixes a description of the program with a discussion of the process of garbage collection.

## The Program

An inspection of the program listings reveals that it contains few graphic commands. In fact, no HPLOT, DRAW, or XDRAW commands are used to put images on the screen. The only graphic commands are those in statements 230 (to clear the screen) and 380 (to control whether four lines of text will appear at the bottom of the screen). Yet the program generates large green and violet blocks on the high-resolution screen. The secret of how the colors are generated is that the program defines string variables which lie in the region of memory used by the high-resolution graphics screen. The program provides a window into memory so that you can see variable storage in action.

Color works in strange ways on the Apple, so we can pick values for string variables which will turn on dots of only a particular color. Statements 270, 280, and 290 define string variables which, when stored in memory by the program, will appear

```
]LIST

100  REM

   GARBAGE COLLECTION DEMO
RICHARD CORNELIUS/MEL ZANDLER
   WICHITA STATE UNIVERSITY

CALL -A.P.P.L.E. : NOV. 1982

140  REM
INITIALIZATION

150  PRINT  CHR$ (4);"BLOAD FAST
     GARBAGE"
160  HOME
170  VTAB 21
180  PRINT "COMMANDS: M=MIX/FULL
     GR   A=AUTO  F. GBG";
190  PRINT "           F=FORCE FRE
     (0)  G=FORCE F. GBG";
200  PRINT "           I=INSERTS O
     RANGE STRING"
210  VTAB 24: PRINT "I =";
220  HTAB 17: PRINT "FREE SPACE =
     ";
230  HGR
240  HIMEM: 16384: REM
TOP OF HIRES SCREEN

250  LOMEM: 4800
260  DIM G$(1022)
265 GARBAGE = 37700
270 PURPLE$ = "U*U*U*U*"
280 GUREEN$ = "*U*U*U*U"
290 ARANGE$ =  CHR$ (170) +  CHR$
     (213) +  CHR$ (170) +  CHR$
     (213) +  CHR$ (170) +  CHR$
     (213) +  CHR$ (170) +  CHR$
     (213)
```

# GRAPHIC GARBAGE COLLECTION

on the graphics screen in the color indicated by the variable name: PURPLE$ is violet, GUREEN$ is green, and ARANGE$ is orange. The color names themselves could not be used as variable names because they each have an embedded word which is part of the BASIC language on the Apple (LET, GR, and OR).

Statements 240 and 250 establish the limits of the memory space available for variable storage. LOMEM is set at 4800. This value allows room for all of the pointers for the array G$ (1023) to fall below the high-resolution screen. The setting of HIMEM at 16384 places the string definitions on the high-resolution screen. The eight bytes at the end of the 8K thought of as the memory for the high-resolutions screen do not actually appear on the screen. These eight bytes hold the definitions for ARANGE$. The string variables GUREEN$ and PURPLE$ have their definitions within the text of the program. These settings for HIMEM and LOMEM have been chosen so that only the string definitions for G$ (I) and DUMMY$ appear on the Hi-Res screen during the program's normal operation. Setting LOMEM to 8192 would place the pointers on the graphics screen. The creation of the pointers would then graphically appear at the same time as the string definitions. This altered setting spoils the pattern in the graphics, but is nevertheless instructive.

If you simply RUN the program, the upper portion of the screen will fill with violet and green lines each 56 dots (8 characters) wide. Pressing "M" (the mixed/full screen graphics toggle switch in the program) will change the screen so that no text appears at the bottom of the screen. The screen will fill with the violet and green lines that represent string definitions until the entire screen is a checkerboard of violet and green squares. A line appears each time one of the variables G$ (I) or DUMMY$ is defined as PURPLE$ or GUREEN$, respectively, within the program. If "M" is pressed again before the screen fills, you can see printed at the bottom of the screen the decreasing amount of free space between the variable arrays and the string definitions. When the amount of free space approaches zero, or when free space approaches 1000, if you have selected the "A" command, garbage collection will occur. At this point all action by the program statements ceases (as can be demonstrated by a run with TRACE turned on) and the variables are sorted to see which string definitions are still active. All of the purple G$ (I) definitions will be active since the program only goes once through the FOR-NEXT loop which defines them. Only one definition of the variable DUMMY$ will be active.

Each time through the FOR-NEXT loop the variable DUMMY$ is defined and occupies an eight-byte green block of memory. When garbage collection occurs, all of the eight-byte green blocks except the first one (which is off of the screen) will be discarded. The memory is not erased, but it is freed for reuse by moving up in memory the nearest active purple string below the wasted memory.

After garbage collection, the G$(I) variables, which had been separated by unused definitions of DUMMY$, are collected in sequence, creating a long violet line that wraps numerous times around the edge of the screen. When garbage collection is complete, the program continues where it had been interrupted. After enough garbage collection sequences (depending upon the amount of memory allowed by the LOMEM setting) the screen will fill with purple blocks.

Pressing an "F" while the program is in normal operation will force garbage collection through the execution of the FRE (0) command. Pressing "G" will force a fast garbage collection; A will enable automatic fast garbage. Another operation available is the random insertion, by pressing "I," of an orange (ARANGE$ in the program) eight-byte block. Since ARANGE$ is defined early in the program before any of the G$ (I) variables (and thus off of the screen), garbage collection will eventually eliminate all of the orange lines from the screen. —●→

```
300 DUMMY$ = GUREEN$
310 DUMMY =  FRE (0)
320 KB =  - 16384:KS =  - 16368
330  DEF  FN SPACE(DUMMY) =  PEEK
     (111) + 256 *  PEEK (112) -
      PEEK (109) -  PEEK (110) *
     256
340  REM
DEFINE STRINGS

350  FOR I = 0 TO 1022
360 CHR =  PEEK (KB): REM
EXAMINE KEYBOARD

370  IF CHR < 127 THEN 430
375  IF CHR = 65 + 128 THEN FG =
      NOT FG: GOTO 420: REM  'A'

380  IF CHR = 77 + 128 THEN P =  NOT
     P: POKE  - 16301 - P,0: GOTO
     420
390  IF CHR = 70 + 128 THEN X =  FRE
     (0): GOTO 420: REM  'F'
395  IF CHR = 71 + 128 THEN  CALL
     GARBAGE + 10: GOTO 420: REM
     'G'
400  IF CHR = 73 + 128 THEN DUMMY
     $ = NULL$ + ARANGE$: REM 'I'

410  IF CHR = 27 + 128 THEN 480: REM
      'ESC'
420  POKE KS,0: REM
CLEAR KEYBOARD STROBE

430 G$(I) = NULL$ + PURPLE$
440 DUMMY$ = NULL$ + GUREEN$
450  VTAB 24: HTAB 5: PRINT I;
460  HTAB 30: PRINT  FN SPACE(DUM
     MY);"    ";
465  IF FG THEN  CALL GARBAGE
470  NEXT
480 DUMMY =  FRE (0)
490  POKE  - 16301,0: HOME : VTAB
     22: PRINT "THE END."
```

# GRAPHIC GARBAGE COLLECTION

### Conclusion

The technique of using the Hi-Res screen to see computer memory action is also useful for looking at other aspects of the Apple. One possibility is to POKE 104 with the value 32, type HGR, and then load a short program. The representation of the program will appear on the graphics screen, so as you type program changes at the bottom of the page, you can see the changes appear on the graphics screen each time that you press RETURN.

For those interested in speeding up their garbage collection, a hex dump of it appears here. A CALL 37700 will enable automatic fast garbage whenever free space falls below 1K of memory; CALL 37710 will force collection at the time of the CALL.

```
*9344.94E7   — FAST GARBAGE —
9344- A5 70 38 E5
9348- 6E C9 04 90 01 60 20 D8
9350- 94 A6 73 A5 74 86 6F 85
9358- 70 A0 00 84 8B A5 6D A6
9360- 6E 85 9B 86 9C A9 55 A2
9368- 00 85 5E 86 5F C5 52 F0
9370- 05 20 F3 93 F0 F7 A9 07
9378- 85 8F A5 69 A6 6A 85 5E
9380- 86 5F E4 6C D0 04 C5 6B
9388- F0 05 20 E6 93 F0 F3 85
9390- 94 86 95 A9 03 85 8F A5
9398- 94 A6 95 E4 6E D0 07 C5
93A0- 6D D0 03 4C 8E 94 85 5E
93A8- 86 5F A0 00 B1 5E AA C8
93B0- B1 5E 08 C8 B1 5E 65 94
93B8- 85 94 C8 B1 5E 65 95 85
93C0- 95 28 10 D3 8A 30 D0 C8
93C8- B1 5E A0 00 0A 69 05 65
93D0- 5E 85 5E 90 02 E6 5F A6
93D8- 5F E4 95 D0 04 C5 94 F0
93E0- BA 20 F3 93 F0 F3 B1 5E
93E8- 30 05 C8 B1 5E 30 03 4C
93F0- 7D 94 C8 B1 5E F0 F8 85
93F8- 18 C8 B1 5E 85 19 C5 6F
9400- C8 B1 5E 85 1A E5 70 B0
9408- E6 A5 19 CD E8 94 A5 1A
9410- ED E9 94 90 68 A5 19 C5
9418- 6D A5 1A E5 6E 90 D0 A2
9420- 41 CA CA A5 19 DD E7 94
9428- A5 1A FD E8 94 90 F2 86
9430- 1B A2 03 BD E7 94 9D E5
9438- 94 BD E8 94 9D E6 94 BD
9440- 28 95 9D 26 95 BD 27 95
9448- 9D 25 95 BD 68 95 9D 66
9450- 95 BD 67 95 9D 65 95 E4
9458- 1B E8 E8 90 D6 A6 1B A5
9460- 19 9D E7 94 A5 1A 9D E8
9468- 94 A5 18 9D 28 95 A5 5E
9470- 9D 67 95 A5 5F 9D 68 95
9478- A5 8F 9D 27 95 A5 8F 18
9480- 65 5E 85 5E 90 02 E6 5F
9488- A6 5F A0 00 60 60 A2 3F
9490- BD 28 95 A8 F0 F7 38 A5
9498- 6F FD 28 95 85 6F A5 70
94A0- E9 00 85 70 BD E7 94 85
94A8- 1C BD E8 94 85 1D 88 C0
94B0- FF F0 06 B1 1C 91 6F 90
94B8- F5 BD 27 95 29 04 4A A8
94C0- C8 BD 67 95 85 1C BD 68
94C8- 95 85 1D A5 6F 91 1C A5
94D0- 70 C8 91 1C CA CA 10 B8
94D8- A2 3F A9 00 9D 28 95 9D
94E0- E8 94 CA 10 F7 4C 59 93
```

*Readers interested in pursuing the subject further may wish to check the following references:*


"Fast Garbage" Randy Wigginton Call-A.P.P.L.E. Jan. 1981

"Applesoft from Bottom to Top" Val J. Golding Call- A.P.P.L.E. in Depth no.1

"Garbagemen Strike: Selective String Preservation" Clay Ruth Call- A.P.P.L.E. Aug. 1982

"Weeding Out the Trash" Clay Ruth Call —A.P.P.L.E. Nov. 1982



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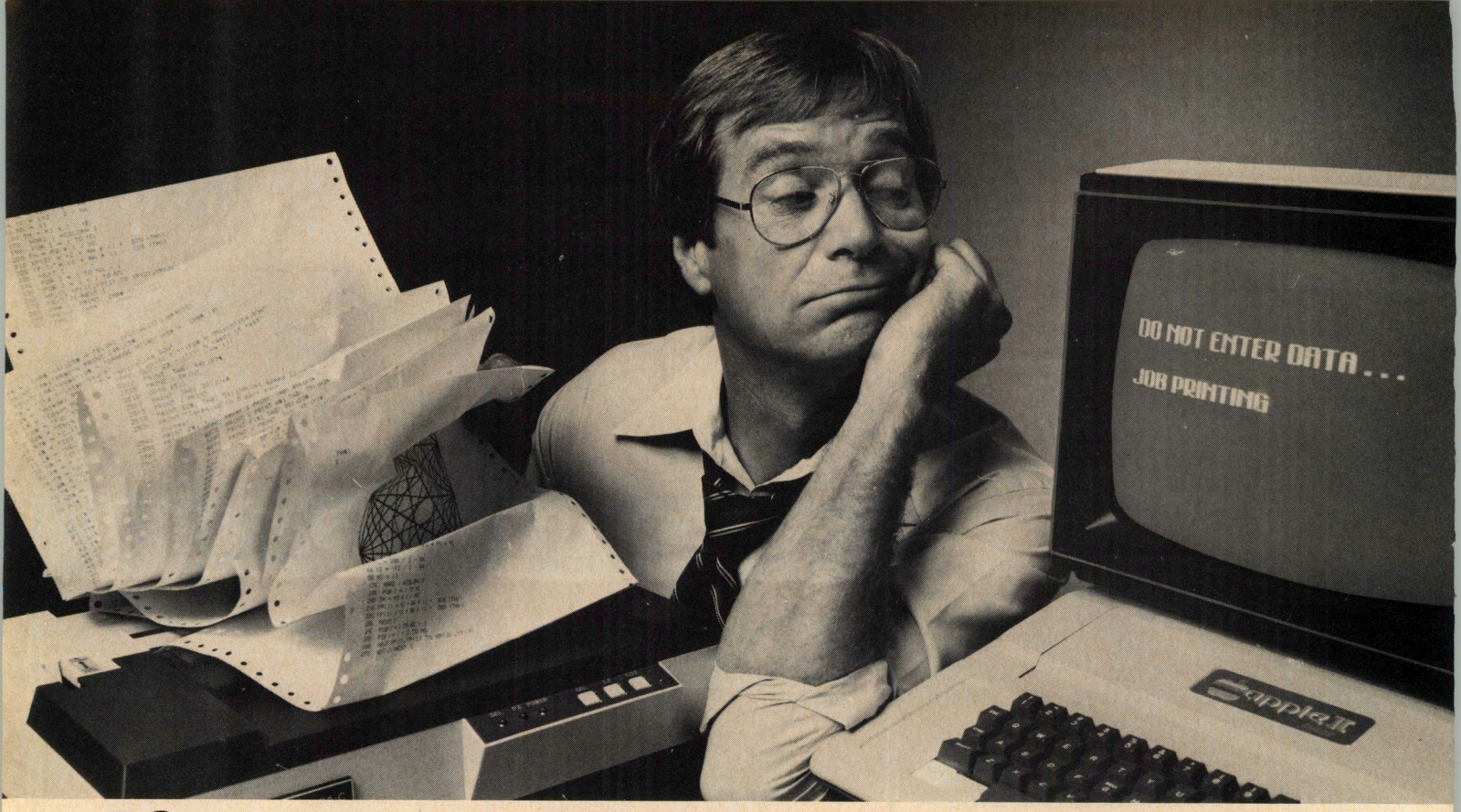


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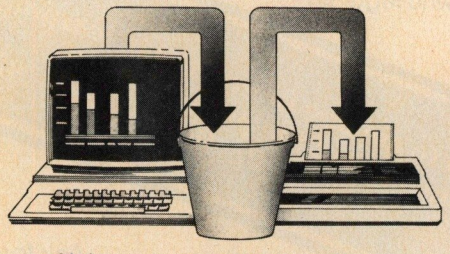

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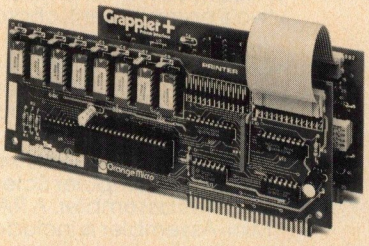


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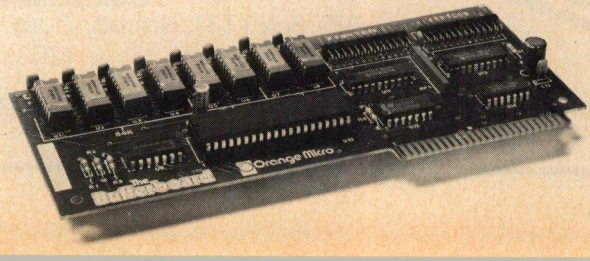


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A Call —A.P.P.L.E. TUTORIAL:

# TO PEACEABLY ASSEMBLE

David G. Sparks/Call —A.P.P.L.E. Staff Writer

A puzzle, shrouded in mystery, wrapped in an enigma." Sir Winston Churchill said that about Russia once. But surely, if good Sir Winston had lived to see the day of microcomputers, he would have said the same about assembly language.

Perhaps it was not so long ago that you brought your Apple proudly home from the store. The nice salesman had left you with the sense that the whole world now lay at your feet forevermore. You quickly set up your equipment; switched it on — perhaps played a game or delved into Visicalc or something.

Before long, you decided to learn to program. After all, hadn't every child above the age of ten written programs at school already? If they could do it, well harrumph! So could you.

Maybe BASIC came easily for you. Maybe not. Either way, as you began to tire of re-inventing the wheel, you turned to this or that magazine to inspire you, teach you, broaden you, quicken your progress. That is probably when your eyes first fell upon assembly language program listings.

"What on Earth!?" you gasped. If you are like most people we know, you said, "World at my feet, my eye! These are mountains!" You proceeded to bypass assembly listings ever since.

At least you tried to avoid them, but nagging away in the back of your mind was the mystery, the puzzle. You knew that something called "machine language" was much, much faster than BASIC. You read how to type in short utilities by rote without knowing what you were doing. You may even have done it a few times. As Hillary to Everest, you kept turning your thoughts toward assembly language: the impossible which must be dared, simply because it exists.

Fine. We will be your sherpa, to lead you from the familiar territory of BASIC to the first camp of assembly language.

As in any adventure, you will have a quest. We will assume that you have purchased that very excellent tool of exploration, the Big Mac.LC assembler from *A.P.P.L.E.*, since it is so inexpensive and so powerfully complete.

Within Big Mac there is a command, UPPER, which, in comment lines, turns all lower-case letters in a program listing into upper case letters. We who have never purchased lower case display chips appreciate that. Mac kindly displays the lower case letters as flashing characters, so we don't see gibberish, but a screenful of flashing text is hard on the eyes.

Even so, it is useful to have lower case letters in the comments when outputting to the printer, because it makes the program easier for humans to read. Alas, Mac lacks a LOWER command.

We shall write one in BASIC, then make a literal translation into assembly language. This is how your author made the transition from BASIC to assembly programming — writing machine code programs which exactly correspond to good, old, familiar BASIC programs.

It is worth noting that programming in assembly language, although more code efficient, is considerably more time consuming than programming in BASIC, since an assembly program must perform a number of operations to accomplish the equivalent of a simple statement in BASIC. To get an idea, compare the two versions of X = X + 1.

Just to make life more interesting, our editor requested that we convert only comments to lower case, not program labels and statements. Comments in Big Mac begin with either "*" or ";" (if they do not, then you're in big trouble!), which clue Mac to ignore everything up to the next carriage return character. In BASIC, this clue is provided by the symbol "REM." Our Editor also requested that the first non-space character of each comment be left as it was, usually a capital letter. Why, we don't know. *(Who wants to begin a sentence with a small letter? ...ed)* But whose bread we eat, his song we sing.

The other thing our little program will have to deal with is text of unknown length. Fortunately, Big Mac always puts a "stop sign" at the end of its program text. While at Mac's Edit level, you can type MON to drop into the Apple Monitor. Type E.F [return] to see the current end-of-file address. Type the two bytes of the address in reverse order with no space between them and hit return. You should see either 00, 80, or FF, which in decimal are 0, 128, and 255. Type [Ctrl-Y] to return to Mac.

A couple of other things we find out by nosing around: space characters inside comment lines are represented by $20, or decimal 32, to distinguish them from space characters in the program proper. "*" has an ASCII value of $AA, decimal 170. ";" has a value of $BB, decimal 187. Carriage returns marking the end of each line have a value of $80, decimal 141. —●→

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# TO PEACEABLY ASSEMBLE

Equipped with all this wonderful knowledge, we are ready to begin the assault.

Listing 1 is the result. It has to be short and compact, because Applesoft starts its programs at $801, decimal 2049, and Mac starts its text at $901, decimal 2305. That leaves only 256 bytes for program and variables.

We use two variables: X and A. In line 100 X is set to 2304, one less than the start of the text. This is because the first thing line 110 does is increment X, making it "point" to a character in the text.

Line 110 continues by setting A equal to PEEK(X). It then subjects A to a series of tests. Note the use of ON...GOTO instead of IF...THEN. This allows multiple testing on the same line, making the program occupy less space in the computer. The first three tests look for the "stop signs". If A holds any of those three values, the program will branch to the END statement at line 140. The next two tests look for the comment "tokens". Failing to find either of these, the line repeats itself. When it finds either of them, it "falls through" to line 120.

In line 120 we hunt for the first non-space character, while remaining ever vigilant for end-of-line tokens. If a value of 141 is found, we are through with the comment line and must return to the main hunt in line 110. If a value of 32 is found, we are looking at a space character, and must remain in line 120 a while longer. Upon finding something that is neither a space nor a carriage return, we "fall through" to line 130.

This line is lengthier than good BASIC style would normally allow, but it is in a form which translates literally into assembly language, as you will see.

After the usual formalities of upping X and PEEKing A, we again test for a carriage return. Finding none, we continue testing to see if A is in the range of letters. If not, restart line 130 to check the next character. If A is in range, add 32 to it, POKE it back into the spot where we found it, and GOTO 130 to continue the search.

The routine searches a text file until finding "*" or ";". It then operates on all succeeding bytes up to the next carriage return, capitalizing the first non-space character and changing all subsequent letters to lower case.

Type in the program now and save it to disk as LC.BASIC.

Soon you will use it to convert the comments in a Big Mac file. You will discover that it works just fine, but is slow as sun-dried sap. A file several thousand bytes long can tie up this BASIC program for several minutes.

Comes now the transition to machine code. First of all, you probably know that your Apple has no earthly idea what PEEK and POKE mean, nor any word you recognize for that matter. Apple's 6502 microprocessor likes its information one byte in length, crisp and to the point. Therefore the BASIC interpreter converts your excellent typing into a sort of modified machine code just as fast as you can hit [return].

Listing 2 is a "hex dump" of the actual BASIC program in Listing 1, as stored in memory and ready to run. If you want an analysis of what you see, consult "Applesoft from Bottom to Top," *Call -A.P.P.L.E. in Depth #1,* All About Applesoft. Editor Golding authors a lengthy pick-apart in there for you. Listing 2 is included here just to show you that, in a way, with the help of the BASIC interpreter, you are already programming in pseudo "machine language."

Listing 3 is a "hex dump" of an actual machine language program which exactly duplicates the function of LC.BASIC, step-by-step. Only the most brilliant, highly-trained, experienced programmer would have the foggiest notion of what it does, however, from the way it looks here.

If you ever want to feel humble, think about this: when Messrs. Jobs and Wozniak took their first seedling Apple to computer club meetings back in the dark ages six or seven years ago, they had to enter thousands of bytes of code just like Listing 3, by hand from the keyboard, each time they turned it on.

**LISTING 1**

```
]LIST

10  REM

CONVERT BIG MAC COMMENTS TO L/C

        BY DAVID SPARKS

 CALL -A.P.P.L.E.   : NOV. 1982

100 X = 2304
110 X = X + 1:A =  PEEK (X): ON (
     A = 0 OR A = 128 OR A = 255)
      GOTO 140: ON (A (  ) 187 AND
     A (  ) 170) GOTO 110
120 X = X + 1:A =  PEEK (X): ON A
     = 141 GOTO 110: ON A = 32 GOTO
     120
130 X = X + 1:A =  PEEK (X): ON A
     = 141 GOTO 110: ON (A (  =
     192 OR A )  = 224) GOTO 130:
      POKE X,A + 32: GOTO 130
140  END
```

**LISTING 2**

```
]FILEDUMPLC.BASIC.HEXDUMP
0800: 00 0C 08 64 00 58 D0 32
0808: 33 30 34 00 48 08 6E 00
0810: 58 D0 58 C8 31 3A B4 28
0818: E2 28 58 29 D0 30 CE E2
0820: 28 58 29 D0 32 35 35 29
0828: AB 31 34 30 3A B4 28 E2
0830: 28 58 29 D1 CF 31 38 37
0838: CD E2 28 58 29 D1 CF 31
0840: 37 30 29 AB 31 31 30 00
0848: 6D 08 78 00 58 D0 58 C8
0850: 31 3A B4 E2 28 58 29 D0
0858: 31 34 31 AB 31 31 30 3A
0860: B4 E2 28 58 29 D0 33 32
0868: AB 31 32 30 00 A9 08 82
0870: 00 58 D0 58 C8 31 3A B4
0878: E2 28 58 29 D0 31 34 31
0880: AB 31 31 30 3A B9 58 2C
0888: E2 28 58 29 C8 33 32 CA
0890: 28 E2 28 58 29 CF 31 39
0898: 32 CD E2 28 58 29 D1 32
08A0: 32 34 29 3A AB 31 33 30
08A8: 00 AF 08 8C 00 80 00 00
08B0: 00
```

*Woz wrote Integer Basic this way!* Or so I'm told.

Clearly, something better was needed. Consider Listing 4. It is the identical code, but broken into groups of two or three bytes, and each group has a so-called "mnemonic opcode" plus, in most cases, an "operand" associated with it. Here is something which, with a little study, a reader might hope to be able to understand. The listing is produced by the "disassembler" in the Apple Monitor.

Learning the opcodes and how they work is no more difficult than learning the words BASIC uses. It takes about as much time, trial, error, correction, and eventual success. Some good books that helped this novice programmer greatly were Assembly Lines: The Book, by Roger Wagner, and Using 6502 Assembly Language, by Randy Hyde.

You can enter the machine language by hand now, if you want. Just type CALL -151 [return], and when you see the "*" prompt, enter Listing 3 with a [return] at the end of each line.

But turn now to Listing 5. Here is one of those complicated-looking assembly language listings they are always putting in this magazine. Look closer. Most of the verbiage is helpful commentary. In fact, Listing 5 is an integral part of this article, because it is fully self-descriptive. Why don't you spend the next few minutes typing it in with Big Mac? Mac provides the line numbers automatically. You type everything to the right of the numbers. The stuff to the left of the numbers, which you already recognize as the actual machine code, Mac writes for you when you "assemble" the program. Gee, this is really a lot like BASIC, where you write in English, and the computer interprets into machine code for you.

We'll wait here for you to get finished... Note that we supplied the source code listing in lower case for readability, but if you want to test this program, you had better type it in in upper case only.

Got it typed in? Ready for some action? Exit the Editor via the "Q" command, then save the "source code" to disk under the name of LC. Exit the Command Mode with the "Q" command. RUN LC.BASIC. Whistle a few stanzas of the Largo movement from Dvorak's New World Symphony while waiting for it to end. Re-enter Mac with the ASSEM command. Re-enter the Editor with the "E" command. List the source code with "L." Voila!

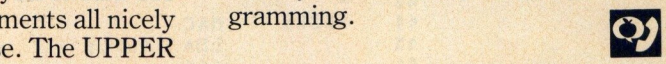
If anything went wrong, just type NEW then go to the Command mode and re-load LC. But you should see your source file's comments all nicely converted to lower case. The UPPER command in the Editor will return everything to the way you originally typed it.

Now assemble the code. Exit to the Command Level and save your "object code" with the "O" command. "Q" your way back to the outside world and BRUN LC. Shazam! Before the disk has quit spinning, the flashing cursor tells you the job is done. Type ASSEM, E, L and see for yourself.

This is why you see so much machine language in this and other magazines. Number one, it is not difficult to program useful, little routines. Number two, they are firecracker fast. Number 3, refer again to number 1 and number 2.

This author still programs in BASIC, makes forays into PASCAL, and wants especially to learn LOGO. But for fast-action subroutines, string-handling without garbage collection, oversized math, and a few other purposes we can think of beyond the simple fun of it, assembly has been the most useful thing we have learned in the past year.

For about the price of a game diskette, you can acquire Big Mac and a book or so to help you learn quickly, easily, right the first time. Who knows? Before too long you, too, may be dazzling your friends with your assembly language programming.



**LISTING 3**

```
]FILEDUMPLC.DUMP
0300: A0 00 A9 01 85 06 A9 09
0308: 85 07 E6 06 D0 02 E6 07
0310: B1 06 C9 00 F0 3E C9 80
0318: F0 3A C9 FF F0 36 C9 AA
0320: F0 04 C9 BB D0 E4 E6 06
0328: D0 02 E6 07 B1 06 C9 8D
0330: F0 D8 C9 20 F0 F0 E6 06
0338: D0 02 E6 07 B1 06 C9 8D
0340: F0 C8 C9 C0 F0 F0 90 EE
0348: C9 E0 B0 EA 18 69 20 91
0350: 06 4C 36 03 60
```

**LISTING 4**

```
]FILEDUMPLC.DISASSEMBLY
0300-  A0 00     LDY   #$00
0302-  A9 01     LDA   #$01
0304-  85 06     STA   $06
0306-  A9 09     LDA   #$09
0308-  85 07     STA   $07
030A-  E6 06     INC   $06
030C-  D0 02     BNE   $0310
030E-  E6 07     INC   $07
0310-  B1 06     LDA   ($06),Y
0312-  C9 00     CMP   #$00
0314-  F0 3E     BEQ   $0354
0316-  C9 80     CMP   #$80
0318-  F0 3A     BEQ   $0354
031A-  C9 FF     CMP   #$FF
031C-  F0 36     BEQ   $0354
031E-  C9 AA     CMP   #$AA
0320-  F0 04     BEQ   $0326
0322-  C9 BB     CMP   #$BB
0324-  D0 E4     BNE   $030A
0326-  E6 06     INC   $06
0328-  D0 02     BNE   $032C
032A-  E6 07     INC   $07
032C-  B1 06     LDA   ($06),Y
032E-  C9 8D     CMP   #$8D
0330-  F0 D8     BEQ   $030A
0332-  C9 20     CMP   #$20
0334-  F0 F0     BEQ   $0326
0336-  E6 06     INC   $06
0338-  D0 02     BNE   $033C
033A-  E6 07     INC   $07
033C-  B1 06     LDA   ($06),Y
033E-  C9 8D     CMP   #$8D
0340-  F0 C8     BEQ   $030A
0342-  C9 C0     CMP   #$C0
0344-  F0 F0     BEQ   $0336
0346-  90 EE     BCC   $0336
0348-  C9 E0     CMP   #$E0
034A-  B0 EA     BCS   $0336
034C-  18        CLC
034D-  69 20     ADC   #$20
034F-  91 06     STA   ($06),Y
0351-  4C 36 03  JMP   $0336
0354-  60        RTS
```

**Listing 5**

```
                *********************************
2               *                               *
3               *  Convert Big Mac comments     *
4               *        To lower case          *
5               *                               *
6               *       by  David Sparks        *
7               *                               *
8               *  Call -A.P.P.L.E. : Nov 1982  *
9               *                               *
10              *                               *
                *********************************
12              *
13              *
14              *
15              *  First an equate, which is what
16              *  Line 100 does in the BASIC
17              *  listing:
18              *
19              X         =     2304        ;100 X = 2304
20              *
21              * REM 2304 is the same as $900,
22              *      which is one before the
23              *      Starting point of
24              *      Big Mac.LC files
25              *
26              *  Now to define two macros.
27              *  Macros are useful for many things, but
28              *  here they are used solely to give clarity
29              *  to the listing below.
30              *  We substitute a familiar-looking
31              *  expression for code when the meaning of
32              *  the code is not readily apparent.
33              *
34              *
35                        DO    0             ;A Big Mac nicety.  Trust me.  Put it in.
36              *
37              *
38              X_PLUS_1  MAC                 ;We'll use this for X = X + 1
39                        INC   6
40                        BNE   ADDED
41                        INC   7
42              ADDED     <<<
43              *
44              PEEKX     MAC                 ;We'll use this for A = PEEK(X)
45                        LDA   (6),Y
46                        <<<
47              *
48              POKEX     MAC
49                        STA   (6),Y
50                        <<<
51              *
52                        FIN                 ;Another bit of Big Mac mystique
53              *
54              *
55              * You will want to consult a book such as
56              * Assembly Lines by Roger Wagner to learn
57              * why the above code replaces the related BASIC
58              *
59              *
60              * Notice in the listings below, how
61              * macros make the text more readable.
62              *
63              *
64              *   Now tell Big Mac where
65              *   we want the program to run:
66              *
67                        ORG   768           ;Same as $300
68              *
69              *
70              *   Now do some initializing that
71              *   BASIC would normally do for us.
72              *
73              *
0300: A0 00     74                LDY   #0
0302: A9 00     75                LDA   #<X           ;Low bytes, start of source
0304: 85 06     76                STA   6
0306: A9 09     77                LDA   #>X           ;High byte of same
0308: 85 07     78                STA   7
```

```
                        79   *
                        80   *
                        81   * REM above code stores X as a 2-byte
                        82   *      integer, exactly the same as Applesoft
                        83   *      does with X%.
                        84   *
                        85
                        86
                        87   LINE110  )))  X_PLUS_1    ;X = X + 1
030A: E6 06             87            INC  6
030C: D0 02             87            BNE  ADDED
030E: E6 07             87            INC  7
                        87   ADDED    (((
                        88            )))  PEEKX       ;A = PEEK(X)
0310: B1 06             88            LDA  (6),Y
                        88            (((
0312: C9 00             89            CMP  #$00        ;IF A = 0
0314: F0 3E             90            BEQ  FINISH      ;THEN branch to FINISH
0316: C9 80             91            CMP  #$80        ;IF A = 128
0318: F0 3A             92            BEQ  FINISH      ;THEN branch to FINISH
031A: C9 FF             93            CMP  #$FF        ;IF A = 255
031C: F0 36             94            BEQ  FINISH      ;THEN branch to FINISH
031E: C9 AA             95            CMP  #"*"        ;IF A = ASC("*") [Which is 170]
0320: F0 04             96            BEQ  LINE120     ;THEN branch to 120
0322: C9 BB             97            CMP  #";"        ;REM note same compare, but new branch:
0324: D0 E4             98            BNE  LINE110     ;IF A <> ASC(";") [decimal 187] THEN 110
                        99   *
                        100  * Satisfy yourself that the
                        101  * above duplicates line 110.
                        102  *
                        103  LINE120  )))  X_PLUS_1    ;X = X + 1
0326: E6 06             103           INC  6
0328: D0 02             103           BNE  ADDED
032A: E6 07             103           INC  7
                        103  ADDED    (((
                        104           )))  PEEKX       ;A = PEEK(X)
032C: B1 06             104           LDA  (6),Y
                        104           (((
032E: C9 8D             105           CMP  #141        ;ON A = 141
0330: F0 D8             106           BEQ  LINE110     ;Branch to 110
0332: C9 20             107           CMP  #32         ;ON A = 32
0334: F0 F0             108           BEQ  LINE120     ;Branch to 120
                        109  *
                        110  * And there you have line 120 (!)
                        111  *
                        112  LINE130  )))  X_PLUS_1    ;X = X + 1
0336: E6 06             112           INC  6
0338: D0 02             112           BNE  ADDED
033A: E6 07             112           INC  7
                        112  ADDED    (((
                        113           )))  PEEKX       ;A = PEEK(X)
033C: B1 06             113           LDA  (6),Y
                        113           (((
033E: C9 8D             114           CMP  #141        ;ON A = 141
0340: F0 C8             115           BEQ  LINE110     ;Branch to 110
0342: C9 C0             116           CMP  #192        ;Now watch:
0344: F0 F0             117           BEQ  LINE130     ;IF A = 192 THEN 130
0346: 90 EE             118           BLT  LINE130     ;IF A < 192 THEN 130
0348: C9 E0             119           CMP  #224        ;Keep watching:
034A: B0 EA             120           BGE  LINE130     ;IF A >= 224 THEN 130
                        121  *
                        122  * That's one way to test for PEEK(X) > 192
                        123  * and PEEK(X) < 224, and if none of the
                        124  * branches were taken, then we have a character
                        125  * in the accumulator which needs changing.
                        126  *
034C: 18                127           CLC              ;This you always do before adding
034D: 69 20             128           ADC  #32         ;Add 32 -- Mac lets you work in decimal numbers
                        129           )))  POKEX        ;This completes POKE X, A + 32
034F: 91 06             129           STA  (6),Y
                        129           (((
0351: 4C 36 03          130           JMP  LINE130     ;Goto 130
0354: 60                131  FINISH   RTS              ;RTS means "RETURN" in assembler.
                        132  * At the end of a program, it
                        133  * Means return to BASIC
                        134  *
                        135  * Each of the "lines" above begins with
                        136  * identical code.  A subroutine would have
                        137  * conserved space, but the purpose here was to
                        138  * exactly duplicate the BASIC program
                        139  * in assembly language.
                        140  *


--End assembly--

85 bytes

Errors: 0
```

*Note:*
*When using Big Mac to enter the source code, only the first line of a group of identical line numbers should be typed; the macro definition does the rest. Example: See line 103 to the left. Do not type the INC 6 or following lines with number 103.*

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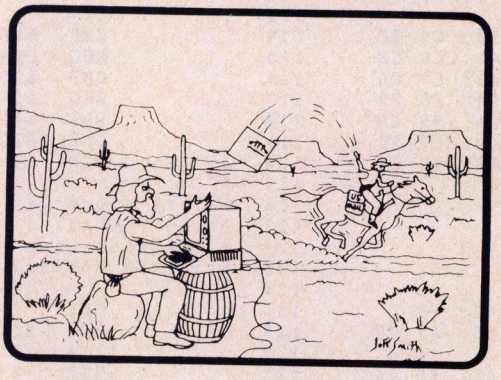

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A Call —A.P.P.L.E. TECHNIQUE:

# SLOW PLOT

Jim Morriset

WHAT an incredible instrument!" I am forced to jump out of my chair, dance around a few times and output a few expletives like this when I realize what goes on inside the Apple. I have yet to become blase about the speed and precision of orchestration of no-moving-parts movements occurring at millions per second in the micro-metropolis under the lid of this unassuming looking device now gracing the homes of millions of earthians.

There are times, however, when we might like some complex operations speeded up by ten or a hundred times or more. Imagine seeing shaded three-dimensional moving pictures in color and of standard video resolution synthesized right before your eyes at keyboard or program command!

There are times, too, when we'd like everything to slow down a little. Sometimes it is comforting for a change to have text print out to the screen more softly and invitingly, say at speed = 120 or less.

SLOW PLOT came out out of my desire to watch graphics images being drawn at a comfortable, contemplative speed. As you will see from the demo program, or by using SLOW PLOT with your own Hi-Res graphics plotting, you can get a better idea of how objects are put together when you can watch them appear on the screen at a rate you might be drawing them. (A technique frequently used on film.)

You can slow down some of the process of drawing a figure via program control, but HPLOTing between points on the screen still occurs at lightning speed.

Ever stop to think of all the nifty little subroutines it takes to decide which dots to light up to approximate a diagonal line? With Applesoft ROM you will never get to watch these routines doing their thing a more leisurely pace. With a language card you can.

SLOW PLOT is a simple assembly-language program that modifies the plotting routines of Applesoft on the language card. It works with the Apple ][ as well as the ][+. For the Apple ][+, a short routine is included which may be entered directly from the keyboard or EXEC'd from a text file, to copy Applesoft from $D000-FFFF to $2000-4FFF, open the language card and install it in RAM $D000-FFFF, make the necessary modifications, then lock the language card. This give you an Apple ][++, with Applesoft in both ROM and RAM. You can switch between them by entering monitor and typing C080 for RAM or C082 for ROM. (or by PEEKing or POKEing the equivalent addresses from BASIC)

Three POKEs have been added to the move routine so you can easily find which Applesoft you are in. Just type "HI" on the keyboard. ROM Applesoft replies with "SYNTAX ERROR," while RAM will admonish you with "SYNFUL ERROR" — or any other modification you may desire to make in the Applesoft message tables.

If you want to see a really funky program listing, try replacing the Applesoft token with a few imaginative words of equal length and thereby use your choice of words.

If you perhaps choose to entertain and amaze your friends, you may set a key on PLE to switch unobtrusively beween your two Applesofts. Might come in handy next April 1.

```
                    ********************************
                    *                              *
                    *  SLOW PLOT  BY J MORRISSETT  *
                    *                              *
                    * Call -A.P.P.L.E. : Nov. 1982 *
                    *                              *
                    * Apple ][ OR ][+  W/Lang card *
                    *                              *
                    * Speed control for HIRES plot *
                    *                              *
                    *   For plotting speed delay   *
                    *          CALL 768            *
                    *                              *
                    *    To install delay value    *
                    *         POKE 809, H          *
                    *         POKE 804, L          *
                    *                              *
                    *  To restore FP RAM plotting  *
                    *     to normal, CALL 826      *
                    *                              *
                    ********************************
                    *
                    *
                    OPENLC   EQU   $C083
                    CLOSLC   EQU   $C080
                    BREAKN   EQU   $F58D
                    JMPBK    EQU   $F597

                             ORG   $300

0300: AD 83 C0               LDA   OPENLC
0303: AD 83 C0               LDA   OPENLC
0306: A9 4C                  LDA   #$4C
0308: 8D 8D F5               STA   BREAKN
030B: A9 19                  LDA   #<BEGIN
030D: 8D 8E F5               STA   BREAKN+1
0310: A9 03                  LDA   #>BEGIN
0312: 8D 8F F5               STA   BREAKN+2
0315: AD 80 C0               LDA   CLOSLC
0318: 60                     RTS
                    *
0319: B1 26         BEGIN    LDA   ($26),Y
031B: 45 1C                  EOR   $1C
031D: 25 30                  AND   $30
031F: 51 26                  EOR   ($26),Y
0321: 91 26                  STA   ($26),Y
0323: A9 FF         TIMER    LDA   #$FF
```

# SLOW PLOT

```
0325: 8D 5A 03   48              STA  TIML
0328: A9 03      49              LDA  #$03
032A: 8D 5B 03   50              STA  TIMH
032D: AD 5A 03   51   TICON      LDA  TIML
0330: D0 22      52              BNE  DECL
0332: AD 5B 03   53              LDA  TIMH
0335: D0 1A      54              BNE  DECH
0337: 4C 97 F5   55              JMP  JMPBK
033A: 8D 83 C0   56   RESTORE    STA  OPENLC
033D: 8D 83 C0   57              STA  OPENLC
0340: A0 00      58              LDY  #$00
0342: B9 19 03   59   RCONT      LDA  BEGIN,Y
0345: 99 8D F5   60              STA  BREAKN,Y
0348: C8         61              INY
0349: C0 03      62              CPY  #$3
034B: D0 F5      63              BNE  RCONT
034D: 8D 80 C0   64              STA  CLOSLC
0350: 60         65              RTS
                 66   *
0351: CE 5B 03   67   DECH       DEC  TIMH
0354: CE 5A 03   68   DECL       DEC  TIML
0357: 4C 2D 03   69              JMP  TICON
035A: FF         70   TIML       HEX  FF
035B: FF         71   TIMH       HEX  FF
--End assembly--92 bytes    Errors: 0
```

```
]LIST

10  REM POKE "SYNFUL ERR"

100 HEX$ = "2000<D000.FFFFM N C08
    3 N C083 N D000<2000.4FFFM N
    D273:46 55 CC N C080 ND9C6G
    ": FOR I = 1 TO LEN (HEX$):
    POKE 511 + I, ASC ( MID$ (H
    EX$,I,1)) + 128: NEXT : POKE
    72,0: CALL - 144
```


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```
]LIST
10  REM
***************

*  SLOW PLOT  *

BY J MORRISSETT

CALL -A.P.P.L.E.

*  NOV. 1982  *

***************
100  TEXT : HOME : SPEED= 110: VTAB
     12: PRINT  TAB( 7)"DEMONSTRA
     TION OF";: SPEED= 0: PRINT "
      SLOW PLOT": SPEED= 110: PRINT
     : PRINT : PRINT  TAB( 15)"PL
     OTTING:": PRINT : PRINT : PRINT
      TAB( 3)"CUBOCTAHEDRON OR VE
     CTOR EQUILIBRIUM" SPC( 30);:
      SPEED= 220: VTAB 23: GOSUB
     160
110  IF  PEEK (769) +  PEEK (803)
     <  > 300 THEN  PRINT  CHR$
     (4)"BLOADSLOW.PLOT"
120  CALL 768:DE = 333: POKE 809,
      INT (DE / 256): POKE 804,DE
     -  PEEK (809) * 256
130  HOME : HGR : HCOLOR= 3: X = 1
     39:Y = 79:A = 91:B = A *  SQR
     (3) / 2:X4 = X + A:X3 = X +
     A / 2:X2 = X + A / 3:X1 = X +
     A / 6:X8 = X - A:X7 = X - A /
     2:X6 = X - A / 3:X5 = X - A /
     6:Y3 = Y + B:Y2 = Y + B * 2 /
     3:Y1 = Y + B / 3:Y6 = Y - B:
     Y5 = Y - B * 2 / 3:Y4 = Y -
     B / 3
140  GOSUB 180: HPLOT X8,Y TO X7,
     Y6 TO X3,Y6 TO X4,Y TO X3,Y3
      TO X7,Y3 TO X8,Y: GOSUB 190
     : HPLOT  TO X7,Y4 TO X3,Y4 TO
     X4,Y TO X3,Y1 TO X7,Y1 TO X8
     ,Y: GOSUB 200: HPLOT X7,Y3 TO
     X7,Y1 TO X,Y5 TO X3,Y6 TO X3
     ,Y4 TO X,Y2 TO X7,Y3: GOSUB
     210: HPLOT X3,Y3 TO X,Y2 TO
     X7,Y4 TO X7,Y6 TO X,Y5 TO X3
     ,Y1 TO X3,Y3: GOSUB 220
150  HPLOT X8,Y TO X4,Y: HPLOT X7
     ,Y6 TO X3,Y3: HPLOT X3,Y6 TO
     X7,Y3: HPLOT X7,Y4 TO X3,Y1:
      HPLOT X3,Y4 TO X7,Y1: HPLOT
     X,Y5 TO X,Y2: GOSUB 230: CALL
     62450: GOTO 130
160  HTAB 31: PRINT "PRESS KEY";:
      GET Q$: PRINT : IF Q$ =  CHR$
     (3) OR Q$ = "N" THEN  TEXT :
      CALL 826: SPEED= 255: END
170  RETURN
180  HOME : VTAB 23: PRINT " FIRS
     T HEX RING";: GOTO 240
190  GOSUB 160: VTAB 23: PRINT "S
     ECOND HEX RING";: GOTO 240
200  GOSUB 160: VTAB 23: PRINT "
     THIRD HEX RING";: GOTO 240
210  GOSUB 160: HOME : VTAB 23: PRINT
     "FOURTH HEX RING";: GOTO 240

220  GOSUB 160: HOME : VTAB 23: PRINT
     "    DIAGONALS";: GOTO 240
230  HOME : VTAB 23: PRINT "    R
     EPEAT?";: GOSUB 160
240  CALL  - 958: RETURN
```

# Apple Users Need Information. Can You Provide It ?

At Apple Computer, we go more than halfway to meet the needs of the people who use our products. Our genuine interest is in solving customer problems, and that means providing as much information as they need to use their Apples effectively.

If you've been into personal computers long enough to know how to spot and take advantage of industry trends (both software and hardware), you could be the kind of hobbyist/technologist that belongs in Technical Communications at Apple.

## Technical Communications Engineer

Here's what you'd be doing: You'd keep up to date on current state of the art, so you can identify data sources, gather information and summarize it, and respond to technical questions from the field support organization. You'll also write and publish applications notes answering common questions, and represent Apple at trade shows and conferences. You'll be concerned with following up on requests to make sure problems are solved, and work closely with Apple's internal marketing, manufacturing and engineering groups. In short, you'll be a liaison between Apple's corporate technical groups and the field support organization.

To qualify, you'll need a BS degree in Computer Science, or equivalent experience, with a background in software and a hands-on knowledge of hardware. You should be fluent in Pascal, COBOL, BASIC, CP/M, and 6502 Assembly languages. Some customer support experience would also be a plus.

Empathy for customers and users is one of the values that guide Apple's day-to-day activities. If you share this value with us and enjoy spreading your technical knowledge, send your resume to Professional Staffing, Apple Computer Inc., 20525 Mariani Avenue, Dept. CAF, MS-16-B, Cupertino, California 95014.

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## The Ultimate APPLE® Utility Program
# COPY II PLUS

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The last DOS utility disk you will need. Fully menu driven, the Copy II Plus utilities include a catalog display with binary file addresses and lengths, a disk usage map, and the ability to verify and compare files for differences. It can copy, lock, unlock and delete files and DOS can be copied, or removed from a disk to free up space. You can change the greeting program on a DOS disk, or initialize a disk from scratch. The Copy II Plus sector editor will allow you to view and modify data in either hex or ASCII format.

For your convenience, Copy II Plus is not copy protected for backup.
Available at fine computer and software stores or direct from:

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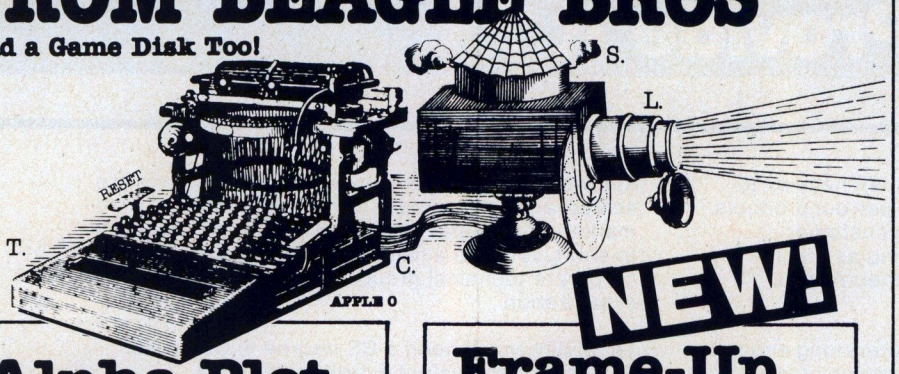
*Attention current Copy II Plus owners:* Return your original disk with $19.95 for an update to Version 4.0.

# NEW APPLE® UTILITIES FROM BEAGLE BROS

**And a Game Disk Too!**




NEW!

## Alpha Plot

### Hi-Res Graphics/Text Utility by Bert Kersey & Jack Cassidy

Here are a few of Alpha Plot's useful graphics features. Compare with other graphic utilities at any price—

**HI-RES DRAWING:** Create hi-res pictures and charts with text, on both pages; all Optional Xdraw cursor (see lines before drawing). Mix colors & Reverse (background opposite). Circles, Boxes, Ellipses; filled or outlined. **Compress Hi-Res to 1/3 disk space.** Relocate any portion of an image anywhere on either page. Superimpose too & convert hi-res to lo-res for colorful abstracts!

**HI-RES TEXT:** Beautiful upper/lower case with descenders (no hardware required). Color and reverse characters positionable anywhere (no vtab/htab limitations). Professional-looking **proportional spacing** and adjustable character height and letter spacing. Sideways typing for graphs too!

**$39.50**
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #4
- ☐ Peeks & Pokes Chart

NEW!

## Beagle Bag!

### 12 Games on One Big Disk by Bert Kersey

Twelve great games from our classic Beagle Bros collection—TextTrain, Slippery Digits, Wowzo, Magic Pack, Buzzword... Almost all of our "Game Pack" games have been updated and re-released on one jam-packed unprotected disk! **ALSO INCLUDED** is our "Beagle Menu" greeting program (description under "Typefaces" disk on this page).

**Compare Beagle Bag with any 1-game locked-up disk on the market today!**

All 12 games are a blast, the price is right, the instructions are crystal clear, AND the disk is copyable! You can even list the programs to see what makes them tick!

**$29.50** Unprotected. Paddles NOT required. Beagle Menu works with all normal-DOS disks. Includes Peeks/Pokes Chart.

## Frame-Up

### Graphics Display Utility by Tom Weishaar

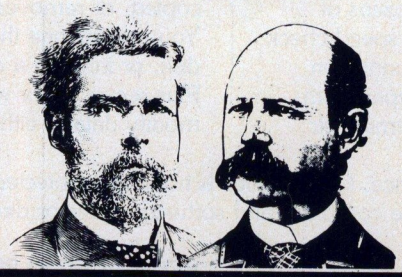
Frame-Up is a very-high-speed Apple "slide projector" utility that lets you create professional-looking displays of intermixed hi-res, lo-res and text pages **on any Apple.** Frame-Up is very easy-to-use and above-all **FAST,** allowing you to load hi-res pictures, for example, in **2¼-seconds;** that's five-times faster than normal! Paddles or keyboard are used to change images in forward or reverse order, skipping pages if you want. OR presentations may be left unattended, with **each page individually timed** to appear and remain on the screen from 3 to 99 seconds, as you choose.

Frame-Up includes a sophisticated black and white **text screen editor** that lets you create text "slides" as part of your show. You can even add type "live" on the screen during your presentations. Up to 17 hi-res or 136 lo-res/text pages may be stored per disk. One or two drives are supported. The order and timing of your graphics and text images may be easily (and instantly!) arranged and rearranged. Frame-Up includes a **display module which may be copied** and distributed to your associates so they can run your display, as you designed it, on their Apple or ANY Apple!

Frame-Up is ideal for store displays, presentations to the boss, club programs, trade show booths, product demos, promotions, seminars, conventions, classes, and so on.

**$29.50** Machine language. Unprotected. 48K minimum. Peek/Poke Chart included.

**BEAGLE BROS DISKS ARE UNLOCKED** AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



**Beagle Bros™ MICRO SOFTWARE**

**4315 Sierra Vista, San Diego, Ca 92103**
**714-296-6400**

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## Apple® Mechanic

### Shape Writer/Byte-Zap Utility by Bert Kersey

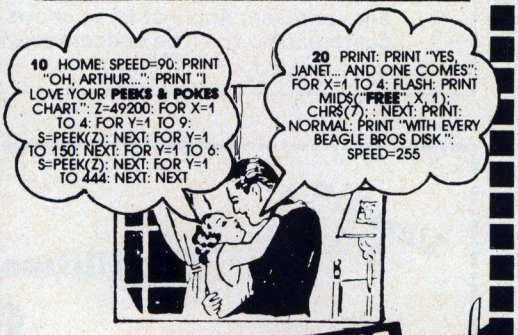
Another best-selling multiple-utility disk—Nine useful, listable, copyable and customizable programs—

**SHAPE EDITOR:** Put professional hi-res animation in your programs. Keyboard-draw any shape and let your Apple write a shape table and store it on disk. Design large and small **custom typefaces** too, with special characters. 6 fonts on the disk. LISTable demos show how to use shape tables to animate games, graphic displays, and attractive Charts & Graphs. A valuable time-saving utility/learning tool.

**BYTE ZAP:** A MUST utility. Rewrite any byte on a disk by loading a sector onto the screen for inspection. **Hex/Dec/Ascii** display optional. Examine bytes via cursor control; enter hex, dec or ascii to change. Create illegal filenames, restore deleted files, change greeting program names, repair/protect disks, change DOS, examine program files. Clear illustrated instructions show how disk data is stored and how to access it. Very educational.

**MORE:** A disk PACKED with useful music, text and hi-res tricks **for use in your programs.** A great demo-writer program, useful hi-res utilities and educational, entertaining documentation.

**$29.50**
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Tip Book #5
- ☐ Peeks & Pokes Chart




NEW!

## Typefaces

### for Apple Mechanic

Here are more hi-res fonts for Apple Mechanic's Xtyper and Hi-Writer programs—26 of them at last count, both large and small, all **proportionally-spaced** and positionable anywhere on either hi-res screen. Most are **full 96-character fonts** many with special graphic characters. Each character (from "!" to "□") of every font (from "Ace" to "Zoo-loo") is, of course, editable with Apple Mechanic's Font Editor.

**BONUS:** Here's BEAGLE-MENU! A unique greeting program that displays **only the catalog file names you want** on the screen (for example, only locked-Applesoft files, or only Binary files) for one-key cursor selection. Just hit Return to Run, Brun or Exec the program at the cursor. Many other features— Space-on-Disk, Load/Bload option, forward and backward catalog "scrolling" for easy file location, and optional sector-number elimination. PLUS the ability to **swap file names** in your catalog!

**$20.00** Unprotected. Beagle Bros' Apple Mechanic disk is required to utilize the type fonts. Beagle-Menu works with all normal-DOS 3.3 disks.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros, 714-296-6400, **OR** his favorite software distributor.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros, 714-296-6400, **OR** his favorite software distributor.

NEW!

# Flex Text

## 70-Column Text Utility
## by Mark Simonsen

Flex Text is a unique utility that lets you print variable-width text on Apple's hi-res screens in normal 40-column format, 20-column expanded or 56- and **70-column condensed** characters. Character widths may be mixed as you like for emphasis. Flex Text understands **normal Applesoft** Basic commands, including Home, Inverse, Normal, Vtab 1-24 and **Htab 1 through 70**! It also supports text window pokes and scrolling, so you can program normally, but with the **ability to add text to graphics**, or graphics to text! You can even run your existing programs using these features!

Flex Text is easy to use; just boot it and go! You can now display **upper and lower case** characters in any width without hardware. Every keyboard character may be redefined as any symbol you like with a custom text **character editor.** You may toggle between the "normal" text screen and both hi-res pages if you like. Flex Text is **completely compatible** with Neil Konzen's Program Line Editor and G.P.L.E.

**$29.50** Machine language. Unprotected. 48K min. Peek/Poke chart included. Condensed character display requires a monitor (instead of a tv) for best results.

```
10 REM HI-RES NUMBER GENERATOR
20 SIZE=5: SCALE=SIZE: REM NUMBER-HEIGHT
30 HGR: HOME: POKE 232, 0: POKE 233, 3: ROT=0
40 FOR A=768 TO 830: READ B: POKE A, B: NEXT A
50 N=N+1: N$=STR$(N): X=99: Y=0
60 FOR A=1 TO LEN(N$): HCOLOR=0: DRAW 8 AT
   X, Y: HCOLOR=3: DRAW VAL(MID$(N$, A, 1))
   AT X, Y: X=X+SIZE+SIZE: NEXT A: GOTO 50
70 DATA 20, 0, 24, 0, 27, 0, 31, 0, 35, 0, 39, 0, 44, 0,
   49, 0, 52, 0, 57, 0, 53, 62, 36, 0, 49, 38, 0, 53,
   55, 61, 0, 53, 23, 37, 0
80 DATA 46, 38, 52, 0, 61, 46, 62, 5, 0, 61, 54, 37, 7,
   0, 53, 38, 0, 54, 37, 60, 46, 0, 53, 39, 53, 62, 5, 0
```

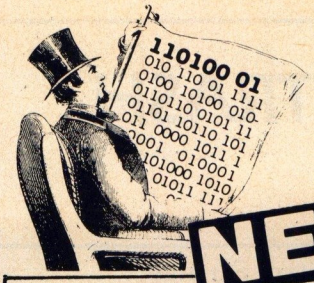
# DOS Boss

## Disk Command Editor
## by Bert Kersey & Jack Cassidy

A classic Apple utility you will ENJOY! Rename DOS commands ("Catalog" can be "Cat", etc.). PROTECT PROGRAMS; any unauthorized save- attempt produces a "Not Copyable" message. Also **List-prevention** and 1-key program-run from catalog. Custom catalogs: Change Disk Volume message to your title; Omit or alter file codes. Rewrite error messages: "Syntax Error" can be renamed "Oops!!" or anything you want! **Two books included**— Fascinating documentation and hours of good Apple reading!

**Dos Boss's change features may be appended to your programs so that anyone using your disks (booted or not) formats DOS as YOU designed it.**

**$24.00**
- ☐ Unprotected disk (32K/48K)
- ☐ The Dos Boss Book
- ☐ Beagle Bros Apple Tip Book #2
- ☐ Peeks & Pokes Chart




NEW!

# Before you buy any Apple game disk, compare features:

**Is there more than one game?** Beagle Bag features TWELVE unique games on one disk PLUS a bonus greeting-program utility for use on all of your existing 3.3 disks.

**Can it teach programming skills?** Beagle Bag games are listable so you can see what makes them work. You can even CHANGE each game's features if you want.

**Is the disk copyable?** Beagle Bag can be backed-up with ANY copy program. Don't buy software that can't be backed up!

**Is the disk unlocked?** The Beagle Bag disk can be catalogged, loaded-from, saved-to and Fidded, making it more flexible and more FUN than any locked-up One-Game disk on the market today.

**Is the disk priced right?** Counting the bonuses, Beagle Bag costs less than $2 per program. This is a disk that will "earn its keep" as long as you own your Apple!

**BEAGLE BAG $29.50**
(See description on previous page.)

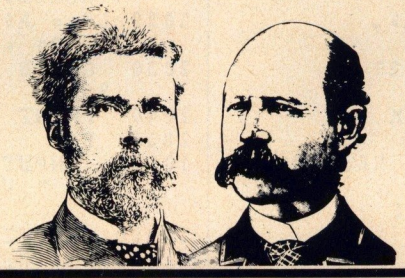
# Tip Disk#1

## 100 Tip Book Tips on Disk
## by Bert Kersey

100 programs from Beagle Bros' Tip Books 1, 2, 3 and 4— Fascinating tricks to make your Apple do things it's never done before! All 100 programs are listable, copyable and changeable; and each teaches another fascinating Apple programming technique. **Two different charts are included.**

**$20.00**
- ☐ Unprotected (32K/48K)
- ☐ Peeks & Pokes Chart
- ☐ Apple II Command Chart

**BEAGLE BROS DISKS ARE UNLOCKED** AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



**Beagle Bros™ MICRO SOFTWARE**

**4315 Sierra Vista, San Diego, Ca 92103**
**714-296-6400**

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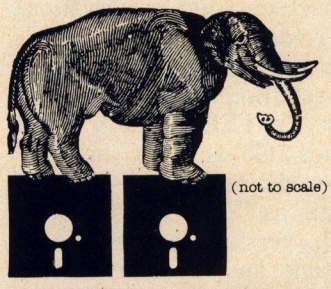
# Utility City

## 21 Utilities on One Disk
## by Bert Kersey

A best-seller since it hit the market, and a MUST for your program-development library. Take a look at the features— **List Formatter** makes properly-spaced & indented listings with page breaks; each statement on new line, if-thens and loops called out; a great de-bugger! **Multi-Column Catalog** in any page-width to any printer or CRT. Auto-post Run-Number and last-used Date in programs. Put INVISIBLE working commands in your listings. Access program lines in memory for repair & illegal alteration. Alphabetize & store info on disk. Run any program while another stays intact. Renumber to 65535. Save inverse, trick and **invisible file names**. Convert dec to hex & binary, or Integer to FP. Append programs. Dump text screen to printer...

21 LISTABLE UTILITIES TOTAL!

**$29.50**
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #3
- ☐ Peeks & Pokes Chart



(not to scale)

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**RUSH!** The disk packages checked below plus the free 11x17 Peeks & Pokes Chart:

| | | | |
|---|---|---|---|
| ☐ Alpha Plot | $39.50 | ☐ Frame-Up | $29.50 |
| ☐ A.Mechanic | $29.50 | ☐ Tip Disk#1 | $20.00 |
| ☐ Beagle Bag | $29.50 | ☐ Typefaces | $20.00 |
| ☐ DOS Boss | $24.00 | ☐ Utility City | $29.50 |
| ☐ Flex Text | $29.50 | | |

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# WEED OUT THE TRASH

Clay Ruth

IN "Garbagemen Strike" (August 1982) I described how to avoid Applesoft's garbage collection process by making "permanent" strings overwrite "temporary" strings as they occur. I spoke of temporary strings only in terms of strings you send to a file, printer or other output device. But there are other, less conspicuous sources of trash in your Applesoft programs.

Listing 1 is the "after" version (including selective string preservation) of another demo program which shows how to weed out these subtle forms of trash. Enter it as shown, and save it as "AFTERWEED". Then change lines 305 and 306 to plain RETURNs, delete line 2030, and save it again as "BEFOREWEED." RUN each version, selecting one demo at a time, and examine memory after each run as you did with the original demo. Notice the difference in the pointer at $6F.70. Here's a rundown of the garbage we've eliminated this time:

**Listing 1**

```
]LIST

10  REM

AFTERWEED DEMO  BY CLAY RUTH

CALL -A.P.P.L.E. : NOV. 1982

15 D$ =  CHR$ (4): GOSUB 305
20  HOME : VTAB 8
30  PRINT "1) INPUT STRINGS": PRINT

40  PRINT "2) CONCATENATION/FRAGM
    ENTATION": PRINT
100  VTAB 20: INPUT "WHICH?";A$
110 X% =  VAL (A$)
120  IF X% < 1 OR X% > 2 THEN 20
130  ON X% GOTO 1000,2000
305 SL =  PEEK (111):SH =  PEEK (
    112): RETURN
306  POKE 111,SL: POKE 112,SH: RETURN

1000  REM  INPUT STRING EXAMPLE
1030  HOME : PRINT "SELECT ONE:":
      PRINT : PRINT
1040  PRINT "1) FIRST OPTION": PRINT

1050  PRINT "2) SECOND OPTION": PRINT

1060  PRINT "3) THIRD OPTION": PRINT

1070  PRINT "4) FOURTH OPTION": PRINT

1080  PRINT "5) FIFTH OPTION": PRINT

1090  PRINT : INPUT "WHICH?";A$
1100 X% =  VAL (A$): GOSUB 306: IF
     X% < 1 OR X% > 5 THEN 1030
1110  ON X% GOSUB 10100,10200,103
     00,10400,10500
1120  INPUT "CONTINUE? (Y/N)";A$:
      GOSUB 306
1140  GOTO 1030
2000  REM  CONCATENATION EXAMPLE
2010 A$ = "APPLES":B$ = "ARE":C$ =
     "THEORY":D$ = "ABSOLUTE":E$ =
     "ASBESTOS"
2020 L$ = A$ + B$ +  LEFT$ (C$,3)
      + D$ +  MID$ (E$,3,4)
2030  GOSUB 306:L$ = "" + L$: GOSUB
     305
2040  PRINT L$
2050  END
10100  INPUT "FIRST PERMANENT STR
     ING:";V$: GOSUB 305: RETURN

10200  INPUT "SECOND PERMANENT ST
     RING:";W$: GOSUB 305: RETURN

10300  INPUT "THIRD PERMANENT STR
     ING:";X$: GOSUB 305: RETURN

10400  INPUT "FOURTH PERMANENT ST
     RING:";Y$: GOSUB 305: RETURN

10500  INPUT "FIFTH PERMANENT STR
     ING:";Z$: GOSUB 305: RETURN
```

## Flow Control Strings

Flow control strings are usually the lesser villains on the trash generation scene. Often they are simply fetching a yes-or-no answer or a menu selection. Any string that is promptly used to determine the program's next course of action, or is promptly converted to a numeric variable, leaves garbage in its wake. But count up those garbage bytes before you bother to tackle them! If the section of code is executed repeatedly (as in a menu you keep returning to), or if it uses long input strings, it is probably worth going after. But a one-byte input string entered once during the program isn't worth a five byte :GOSUB 306 inserted in the code! If the insignificant ones are lumped together with some other garbage you are eliminating, that's fine. But they do not deserve special attention.

The typical menu format shown in the 1000-series lines of Listing 1 shows you how to eliminate the trash generated by a reiterated menu. *Note that the first menu (lines below 200) does not use selective string preservation, as its one-time execution isn't worth the space occupied by the GOSUB.* If you find yourself adding a lot of GOSUBs, you can give the subroutines single-digit line numbers and save a few bytes.

## Concatenation and Fragmentation

Here is a dastardly duo for you! Every time you create a longer string by concatenating shorter strings, you unwittingly gobble up oodles of memory! The problem is even worse if some of the concatenated pieces are fragments (MID$, LEFT$ and RIGHT$).

Try running BEFOREWEED and select demo #2. This demo defines the strings "APPLES," "ARE," "THEORY", "ABSOLUTE," and "ASBESTOS," then concatenates strings and fragments to come up with "APPLESARETHEABSOLUTE BEST".

The original five strings do not appear in the string storage area at all. Simple string assignments using only quotation marks, or using only DATA and READ statements, create string variables that point to the string within the body of the pro-

gram. But once you start concatenating them, every specified fragment plus the various stages of the long string's evolution will all show up in string storage! An examination of memory reveals "APPLESARETHE ABSOLUTEBESTBESTAPPLES ARETHEABSOLUTEAPPLESARE THETHEAPPLESARE". Applesoft consumed 72 bytes in creating a 24-byte string!

If the concatenated string is temporary, you can dump it and all the trash it created when you prepare to assign your next permanent string. But if the concatenation is permanent, you need a way of dumping the trash without losing the final product.

AFTERWEED accomplishes this by doing a phony concatenation in line 2030. Concatenating the desired string to a null string makes Applesoft move it to what it thinks is new storage space. But the GOSUB 306 immediately before the phony concatenation tricks it into overwriting the trash! After running AFTERWEED and selecting demo #2, examine memory again. You will still see two-thirds of the garbage trailing off behind the permanent string, but the $6F.70 pointer now indicates the good stuff. The rest of the trash will vanish when additional strings are assigned.

If you have a string-handling situation I haven't covered, write your own demo program to try out your ideas. You can learn a lot about Applesoft string storage just by experimenting. Before you try running your test program, get into the monitor with CALL -151 and enter 9500:00 N 9501 < 9500.95FEM before returning to Applesoft. This clears the top page of string storage with zeros, so you will know later that anything that isn't zero was put there by your program.

**Note:** *If you do not have 48K, change each of the four occurrences of 95 in the above monitor command to one less than what you find in location $74.*

Finally, I would like to point out an error in the Applesoft reference manual (at least in the one I have). Under the syntactic definition for the FRE(expr) function, it says that if A$×"PIPPIN" and B$×"PIPPIN", then "PIPPIN" will be stored only once. This is not necessarily true! Applesoft doesn't search the whole string area looking for "PIPPIN" or any other string each time it is entered. If "PIPPIN" were entered twice in response to INPUT statements, from the keyboard or from a file, it would also show up twice in the string area. If it appears only in quotes within the program, it won't show up in the string area at all. What I think they were really trying to say is that if you have input "PIPPIN" for A$ and later the program assigns B$=A$, "PIPPIN" appears in string storage only once. A string equality of this type simply copies the pointers from A$ into B$ without repeating the literal. This is why a phony concatenation was needed to move the permanent concatenated string up onto its garbage.

**FIGURE 1**

```
]RUNBEFOREWEED
1) INPUT STRINGS

2) CONCATENATION/FRAGMENTATION

WHICH?2
APPLESARETHEABSOLUTEBEST

]CALL-151

*6F.74

006F- B6
0070- 95 CE 95 00 96   Strings reside from $95B6 through $95FF.
*95B6.95FF

95B6: 41 50                                     AP
95B8: 50 4C 45 53 41 52 45 54  PLESARET   <- Desired string
95C0: 48 45 41 42 53 4F 4C 55  HEABSOLU
95C8: 54 45 42 45 53 54 42 45  TEBESTBE
95D0: 53 54 41 50 50 4C 45 53  STAPPLES
95D8: 41 52 45 54 48 45 41 42  ARETHEAB   <- Garbage created by
95E0: 53 4F 4C 55 54 45 41 50  SOLUTEAP      concatenation and
95E8: 50 4C 45 53 41 52 45 54  PLESARET      menu selection
95F0: 48 45 54 48 45 41 50 50  HETHEAPP
95F8: 4C 45 53 41 52 45 32 04  LESARE2D
```

**FIGURE 2**

```
]RUNAFTERWEED
1) INPUT STRINGS

2) CONCATENATION/FRAGMENTATION

WHICH?2
APPLESARETHEABSOLUTEBEST

]CALL-151

*6F.74

006F- E7
0070- 95 FF 95 00 96   Permanent strings reside from $95E7 through $95FF.
*95B6.95FF

95B6: 41 50                                     AP
95B8: 50 4C 45 53 41 52 45 54  PLESARET   <- All this garbage lies
95C0: 48 45 41 42 53 4F 4C 55  HEABSOLU      below pointer $6F.70
95C8: 54 45 42 45 53 54 42 45  TEBESTBE      and will be overwritten
95D0: 53 54 41 50 50 4C 45 53  STAPPLES      as more string assign-
95D8: 41 52 45 54 48 45 41 42  ARETHEAB      ments are made.
95E0: 53 4F 4C 55 54 45 41 41  SOLUTEAA
95E8: 50 50 4C 45 53 41 52 45  PPLESARE   <- Permanent strings,
95F0: 54 48 45 41 42 53 4F 4C  THEABSOL      garbage-free.
95F8: 55 54 45 42 45 53 54 04  UTEBESTD
```

**So What Did You Expect Dept.?**

```
]LIST

5  REM

JIM GANZ: CALL -A.P.P.L.E.

10  TEXT : HOME
20  POKE  - 16302,0:
      CALL  - 1998
30  FOR C = 0 TO 6
40  FOR B = 0 TO 6
50  FOR A = 0 TO 39
      STEP 2
60  HPLOT C,0: VLIN
      0,47 AT A
70  HPLOT B,0: VLIN
      0,47 AT A + 1
80  NEXT A,B,C: GOTO
      30
```

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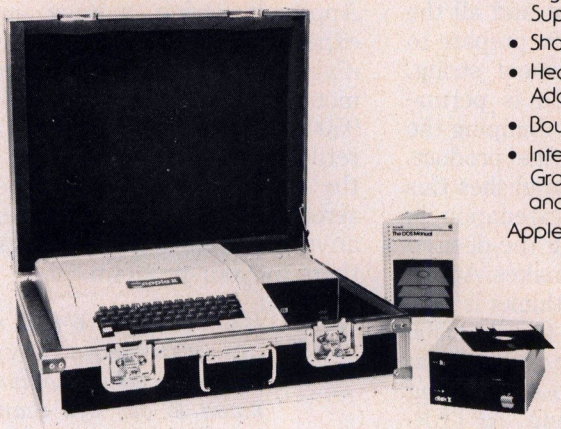

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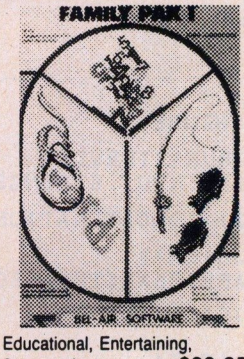


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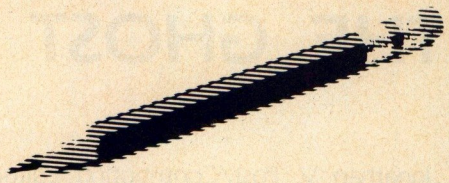

The Readers

## Spoiling Preserves

Dear Val,

YOUR idea was great and the re-implimentation excellent, but there is still one basic fly (or bug) in the ointment. If you have a line such as 100 A$ = "HELLO" in your program, Applesoft will, at run time, store *pointers,* not the actual string. The pointers are aimed at the HELLO in the actual stored program. The string is not rewritten in string memory, thereby saving considerable time and memory. If you use AS PRESERVES to add 50 REM, line 100 will obviously be shifted upwards in memory, and although it won't overwrite variables, it will shift the absolute RAM location of the HELLO in line 100. Thus, when you restore your pointers, they will still point at the location of the string, and A$ will become meaningless gibberish. So, if your program contains any lines such as 100, you cannot insert or delete any lines in front of them. Outside of this, the program works as advertized.

*Larry Houston*
169 West 8th Street
Peru, IN 46970

*YOUR POINT is well taken. In addition, the foregoing also applies to the DEF FN statement which, like a string, has pointers to program memory.*

## Software Support Acclaimed

Dear Mr. Morgan:

Too often these days, while being inured to slipshod service, we easily forget to say thank you when we receive truly superior service from our vendors.

I had been meaning to write regarding some apparent bugs in Global Program Line Editor version 3.2, but now I no longer need to. You have fixed them and sent me an entirely new package of diskette and documentation. Now that is support!

Many thanks!!

*Frank B. Weinberg*
23-D Anthony Circle Woodshade
Newark, DL 19702

*OF COURSE, WE LOVE COMMENTS such as yours, since it brings out some of our member policies, but we'll also print the brickbats when we get 'em.*

## TREAD Lightly

Dear Val,

Stephen E. Bach's letter about a patch to the TREAD program on the ApFile disk (in the August 1982 issue of *Call -A.P.P.L.E.)* was very helpful. I had been trying to adapt the TREAD program to run on multiple disks myself (I have three disk drives but the additional change was trivial once I had Bach's letter in hand). Unfortunately, while the patches that Bach suggests are helpful, they are not complete. As written, the program will find files on either disk drive #1 or #2, but it will only catalog the files from drive #1. The following simple change in line 85 will take care of this problem:

```
86 PRINT : PRINT "DO YOU NEED
   A CATALOG? ";: GET G$: PRINT
   : PRINT : IF G$ = "Y" THEN
   PRINT D$; "CATALOG,D"DR :
   GOTO 86
```

This should make TREAD completely usable on multiple disk drives.

Thanks for publishing a fine and a very usable magazine.

*Norman Hollyn*
178 Spring Street
New York, NY 10012

## GPLE Reset Fix

Dear Val,

Before I do a 'BRUN PLE.LC' in my HELLO program, the following will keep from 'freezing up' the machine if a RESET is hit while stopped after an ESCAPE hit for a stop-list:

```
POKE 65532,242:POKE 65533,3
```

(i.e. set $FFFC.$FFFD to F2 03 in the RAM card so 03F2 can process the RESET) this seems to handle the problem admirably, and so far I've had no problems. Would be nice if GPLE took care of this, but second best would be to let anyone who uses GPLE with a RAM card to know of this. I haven't tested it, but based on what Val told me (and the fact that it works!) seems to indicate it's a good solution.

*Eagle Berns*
735 Lapara
Palo Alto, CA 94306

## Text Screen Dump (again)

Gentlemen:

The following text screen dump program utilizes the SCRN( function (the formula on page 87 of the *Applesoft Manual),* and text window control. Every screen location is printed except for the last position on line 24. This is of little concern, since this point can not be directly plotted, but must be POKEd as shown in the program example.

The program can be modified so as to avoid printing a prompt. For example, the message "DO YOU WANT TO PRINT THIS (Y/N)" may be placed on line 24 and the Y range reduced to 1 to 23 to print only lines 1 to 23.

*N. D. Greene*
School of Engineering
University of Connecticut
Storrs, CT 06268

```
]LIST

100   POKE 33,1: POKE
      32,39: POKE 34,23:
      VTAB 24: HTAB
      40: PR# 1: PRINT
      : FOR Y = 1 TO
      24: FOR X = 1
      TO 40: PRINT
      CHR$ ( SCRN( X
      - 1,2 * (Y - 1))
      + 16 *  SCRN(
      X - 1,2 * (Y -
      1) + 1));: NEXT
      : PRINT : NEXT
      : TEXT : PR# 0:
      CALL 1002
```

```
]LIST

10 X = 2049
20  FOR I = 80 TO 10 STEP  - 10
30  POKE X + 2,I -  INT (I / 256) * 256
40  POKE X + 3, INT (I / 256)
50 X =  PEEK (X) +  PEEK (X + 1) * 256
60  NEXT I
70  LIST
80  REM

 SO WHAT DID YOU EXPECT? : BY

STAN CLEVELAND : CALL -A.P.P.L.E.
```

# THE GHOST IN THE MACHINE

Jonathan V. Post/Contributing Editor

There is moonlight from the window
and it's shining on the screen
of an Apple ] [ computer
in a long-deserted room.
In an eerie pianissimo
the speaker chimes thirteen
and the keyboard, colored pewter,
shudders faintly in the gloom—
from the Ghost in the Machine!

There's a worm in every Apple,
there's a bug in each routine,
and in every life a mystery
and this one haunts me still.
With my conscience I must grapple
once a year, on Halloween,
I recall the horrid history
and feel the ghastly chill
of the Ghost in the Machine!

The programmer was clever
and his logic deadly keen
and my envy then was damning
of his coding, though a friend.
How sad to know that never
in this very magazine
will we read of his programming
since his program reached its end
as the Ghost in the Machine!

Oh, he knew Computer Science
(he was published at sixteen)
there was no numeric knowledge
he could not learn in a day.
Soon the most prestigious clients
paid him so much folding green
that he dropped right out of college,
who could tell there's hell to pay?
Ask the Ghost in the Machine!

An awful plan I did evolve
based on a book he'd never seen
(it was a problem posed by Turing)
that no floppy disks revolvable
could ever help him solve.
I was murderously mean
because, although it was alluring,
the problem was unsolvable—
poor Ghost in the Machine!

He worked from dawn to midnight
then he'd drink some cold caffeine
and go back to work 'til dawn
and never sleep, and never eat.
He grew thin and paper white
but no one thought to intervene
since he kept his curtains drawn
and sat silent in his seat—
as the Ghost in the Machine!

A computer can be deadly
as a sharpened guillotine.
He just faded into firmware,
he was trapped, eternal testing,
as the printer played a medley
like a muffled tambourine.
Though his body became wormware
still, alas, there is no resting—
for the Ghost in the Machine!

There is moonlight from the window
and it's shining on the screen
of an Apple ] [ computer
in a long-deserted room.
In an eerie pianissimo
the speaker chimes thirteen
and the keyboard, colored pewter,
shudders faintly in the gloom—
from the Ghost in the Machine!


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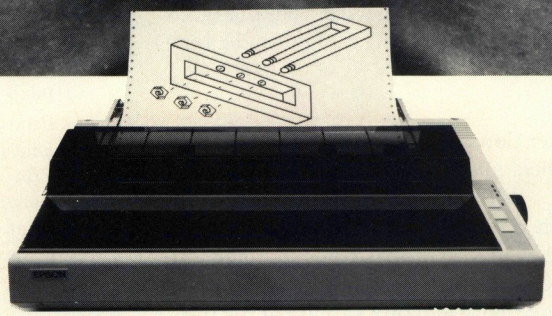

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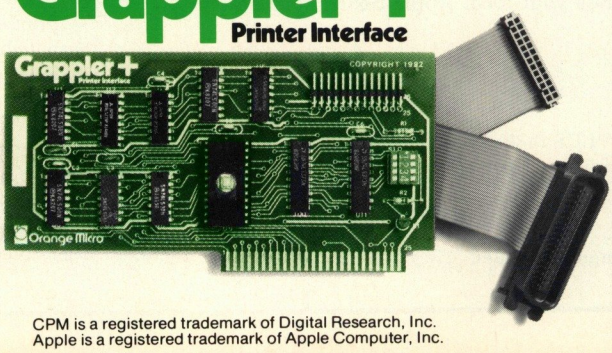


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- Print activity analyses - entire firm
- Print activity analyses - single professional
- Edit data files
- Edit professional summary files
- Generate complete monthly client financial summaries
- Print complete monthly client financial summaries
- Print single client financial summaries

**Utility functions:**

- Edit parameter files
- Data file maintenance:
  - Disk-to-disk transfer of client files
  - Delete client files
  - Re-start (compress) client files
- Print client data disk directories
- Initialize client data disks
- Backup client data disks

**Capacities:**

| | |
|---|---|
| Number of Professionals | 25 |
| Number of clients (entire system) | UNLIMITED |
| Number of clients per disk | 40 |
| Number of data entries per disk | approx. 1600 |
| Client file size | 150 records |

# TOMORROW'S APPLES TODAY

Kevin O. Donohoe/Editor

## HI-RES SECRETS GRAPHICS APPLICATIONS SYSTEM

Avant-Garde Creations presents another winner from the master of graphics! Don Fudge does it again with a friendly, usable graphics package that tells you everything you need to know to create high quality, marketable programs using Apple Hi-Res Graphics. This extensive, unprecedented package takes up where HI-RES SECRETS left off. The programs contained in the GRAPHICS APPLICATION SYSTEM (G.A.S.) can transform a good programmer into a great programmer like magic! The package is designed to lead the user step by step through numerous procedrues including: ordinary Basic programming to faster, better Basic programming; from Basic Hi-Res Graphics to Assembly Hi-Res Graphics. Other step by step procedures include business graphs, electronic and architectural design, arcade and adventure game creation, scene creation, 3-D shapes, shape drawing and shape and scene saving. In addition, the program contains the fastest color-fill routine available.

This new color-filling Palette program has 140 of the most gorgeous state-of-the-art colors ever seen, as well as 160 different color patterns. There are 4 separate fill algorithms included and the program allows the user to fill on both black or white backgrounds.

HI-RES SECRETS GRAPHICS APPLICATIONS SYSTEM contains three unprotected discs plus an extensive manual of over 200 pages in a deluxe three-ring binder. The system requires an Apple II Plus 48K and retails for $75.00. Avant-Garde Creations, P.O. Box 30160, Eugene, OR 97403. (503) 345-3043.

## THE GRAPPLER™ APPLE PARALLEL INTERFACE

The Grappler is a sophisticated Centronics compatible parallel interface for the Apple II and Apple II Plus computers. The Grappler, manufactured by Orange Micro, has on-board firmware to copy the Apple High-resolution graphics screen to many popular graphics printers. The user has the capability of printing Hi-res page 1 or page 2 in several different modes. In the standard mode, each white dot on the Apple's screen is printed as a black dot on the paper. This is for printing charts and graphs. Inverse mode prints the opposite, and is used for printing pictures. The double size option prints each dot on the graphics screen as 4 dots on the printer.

Using simple commands, any combination of the above options may be used to print the Hi-res screen. For example, a sequence of commands typed at the keyboard or imbedded in a user program could print Hi-res page two, double sized, inverse and rotated 90 degrees.

The Grappler also features many text commands including text screen dumps, setting of margins and page lengths, auto-skip-over perforation and word wrap-around with breakpoint on nearest blank. The Grappler interface is


# REPLAY

- COPIES TOTAL LOAD PROGRAMS
- DISK FORMATING IRRELEVANT
- ANALYZE PROGRAMS
- COPY IN JUST 15 SECONDS
- PROGRAM RESTART IN 10
- AUTOMATIC PACKING FILES

REPLAY is an interface card with software in eprom that plugs into one of the APPLE slots. REPLAY does not copy a disk, rather it copies a program executing in memory. The term total load describes a program that fully loads into memory to execute.

The original disk formating is not important. If the program will boot it is possible to make a backup copy that will execute in 10 seconds.

Now game players can save and restart games at a high level. The user plays the game to a level and copies it with REPLAY. Then simply restart the program at that level by running the copy.

APPLE is a trademark for Apple Computer, Incorporated.

The copied program can be executed several different ways. The card comes with an editor utility that operates under DOS 3.3. This allows editing of the copy disk. A second utility is used to pack the copy disk and put it into an executable DOS 3.3 binary file. There are parameter lists for packing popular games and programs included with the card. REPLAY is able to store two copied programs of 48k length on a DOS 3.3 disk. Either file can be executed by a program on that disk.

COST: $129.95 Fully Assembled Card
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compatible with Apple Pascal and CP/M, and currently supports Anadex, IDS Paper Tiger, Centronics 739, Epson MX70 and MX100 printers. It also supports Epson MX80 and MX80/FT printers if they have the Graftrax-80 graphics upgrade installed.

The Grappler interface is sold by a national network of Apple dealers and computer stores. For further information, contact Orange Micro at (800) 854-8275 or (714) 630-3322 for the dealer nearest you.

## TELEPHONE TRANSFER II

**Telephone Transfer II,** by Leighton Paul and Ed Magnin, released through Telepone Software Connection, Inc. (of Torrance, California), provides for the first time, streamlined error free transmission of data between Apple computers equipped with either the Hayes Micromodem II or the Novation Apple-Cat II.

The program sends all DOS 3.3. file types (Applesoft, Integer, Binary, both sequential and random access Text files, and other special file types) using a timesaving "tokenized" transfer method. After the sender's disk is automatically cataloged, he just responds "yes" or "no" to indicate the files he wishes to send. Two on-screen countdown timers display the remaining time in minutes, seconds (and hundredths of seconds) for both the current file and the total transfer.

Probably the most impressive feature of all is the ability to "chat" simultaneously while sending files, thereby allowing you to carry on a conversation, without the expense of tieing up a second phone line.

The program's error detection and correction is based on a highly reliable cyclic redundancy check, and automatic retransmission of any erroneous blocks. Even though phone lines are often victim to static and line noise, which could have adverse affects on the data being trasmitted, once a file is sent and automatically saved at the other end, you can have complete confidence in its accuracy.

Telephone Software Connection is unique in its ability to deliver its products right over the phone via its own Teledelivery$^{\$}$ process to customers with MODEMs. "Telephone Transfer II" costs $75.00 when ordered and delivered over the phone from TSC's MODEM lines at (213) 516-9432, or is available on a magnetic diskette via mail for $80.00 from TSC at P.O. Box 6548, Torrance, CA 90504 or by calling them at (213) 516-9430.

## BITS UNIVERSAL BACK-UP POWER SYSTEM FOR MICRO-PROCESSOR EQUIPMENT

This battery powered system prevents loss of data by automatically switching in regulated power within 10 nanoseconds after existing supply degrades.

With an operating time of up to five hours, the system is also suitable for use as a portable power supply for a wide variety of computer equipment including printers.

Output voltage is +12, -12, +5, and -5 volts DC. Installation requires only household pliers and 15 minutes.

The system is completely enclosed in a 3 x 9 x9 inch portable leather-like case and weighs 15 pounds. Charger and seven-state LED battery monitor are included. Price: $349. Available from Burns Industrial Technical Service Inc., 6456 Danbury, Dallas, TX 75214 (214) 361-4815.


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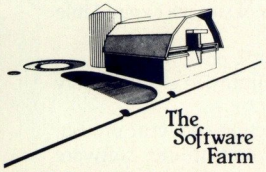


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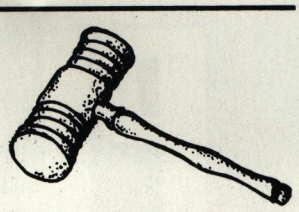
# A.P.P.L.E. MEETING MINUTES



Dave Lingwood/Secretary

September 21, 1982
Seattle University

PRESIDENT Dick Hubert called the meeting of 55 members and guests to order, for the first time in Seattle U's Library Auditorium, at 8:00PM.

**Old / New Business:** none.

**Treasurer's Report:**

Last month showed $186K income and $153K expenses. Mail orders are running about three weeks' fulfillment time, due to the high level of response to the catalog mailing.

**Announcements:**

There will be a computer show at the Kent Public Library, noon to 4PM, Saturday, October 2nd.

**New products:**

1. a 16K RAM card
2. a 128K RAM card
3. A.P.P.L.E. Spreadsheet. Check future issues, or call the main office.

The meeting was adjourned at 8:20PM.

**Q&A:**

Anyone know how to use extra RAM card space as a print spooler? One commercial program, "Doubletime" from SDS does it. Any other contenders might want to send such a program to Val.

Various questions on printers and interface cards. Compatibility would be nice here. Too bad there isn't any in the industry.

APTEST has a program to check disk speeds.

**Speaker:**

Don Brown took us through the labyrinthine world of Eamon (named from a dictionary list of proper names). Eamon is a proper text adventure, too. From author Brown's initial offering, via his authoring program, Eamon has spawned a host of various adventures.

Micro adventures began with the live dungeons and dragons game, substituting the computer for the dungeon master. In Eamon, descriptions are stored on the disk. The player's mind builds the world from the written description — as in any good fiction. Basically, there are three strategies in meeting any situation:

1. Hack it down,
2. Con your way around it (or run),

and

3. Turn it to your advantage or make friends.

Brown believes, by way of a tip to players, that one should not trifle with dragons (sound advice in our modern world).

How does Brown write an Eamon adventure? He begins with about half of the story plot (defining the depth of the trouble the player can get into), a map of the territory, a general list of characters, and a list of artifacts and monsters. Then he stirs these in his mind, imagining situations, building ways the hero can progress, and ways defenses can be overcome. Finally, he fires up the designer disk and writes. (I suspect that only in the latter step does he differ from the good fiction, science fiction, or fantasy author. DL)

The Club now has copies of all known Eamon disks. Sharpen your swords and have at them.


# Supercharge Your APPLE II*

The Axlon RAMDISK™ 320K Memory System for the Apple II and Apple II Plus* provides access speeds never before available. The Axlon memory system is designed to interact with Apple DOS 3.3* and Apple Pascal 1.1* like two standard floppy disk drives while delivering the lightning fast access speeds of RAM memory. This also leaves 32K of RAM for advanced programming techniques. The interface board is slot independent and draws no power from your Apple. The rechargeable battery system built into the unit provides three hours of backup in the event of a power loss. Drop by your local Apple dealer or contact Axlon, Inc. for more information.

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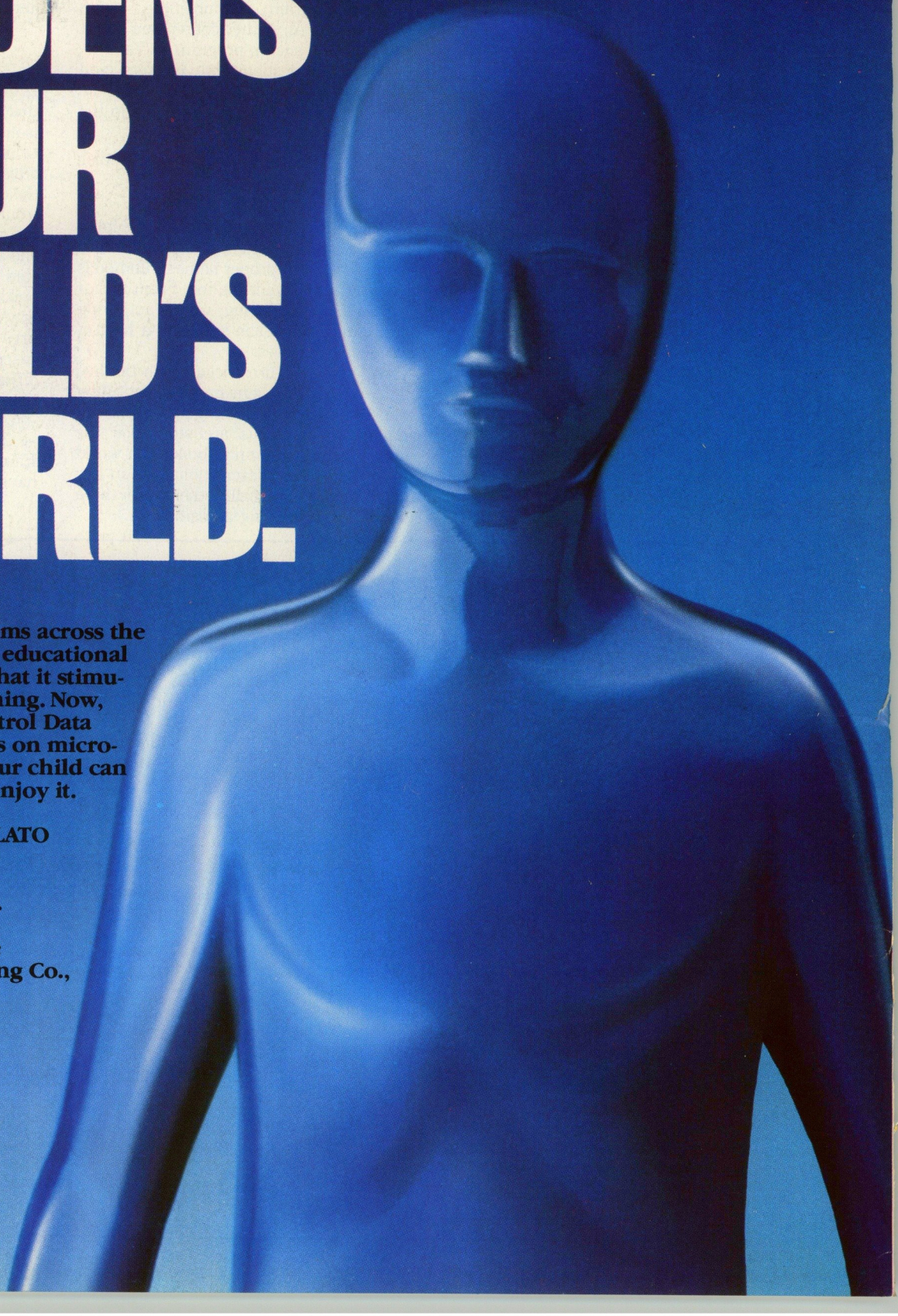

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- **Fractions:** same format as Decimals, but requires the use of fractions to break the balloons. Numbers are entered on a trial-and-error basis. Balloons may burst in any order until none are left. Difficulty adjusts to your child's performance. For elementary math students.
- **Computer Literacy—Introduction:** this lesson is presented in a friendly, non-intimidating manner with touches of humor and simple, supportive graphics. It presents the history and uses of computers in today's society. Designed for junior or senior high and vocational school students.
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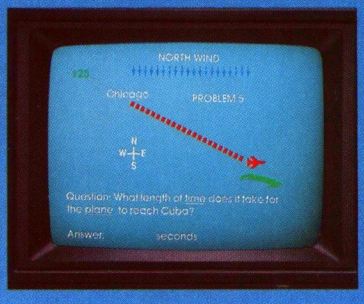


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# A.P.P.L.E. DOCTOR

George Spelvin

**Question:**

*A program on disk has 31 sectors. If I load it on drive 1 and save it on drive 2 — or vice-versa, it shows only 30 sectors on the catalog. However, if I use the COPYA program, both the original disk and the duplicate show 31 sectors. Can you explain why.*

**Answer:**

This is an error of omission in DOS. What happened was somewhere along the line your program actually used 31 sectors. Then during the process of program modifications, it became shorter by one sector. When one DOS file is saved over another, the sector count that the catalog shows will never decrease unless the file is deleted before it is resaved. COPYA is a copy program that copies an entire disk at a time, including the VTOC and directory, including any erroneous entries.

**Question:**

*I have a programming problem I am unable to solve. I need to create a type of INPUT that if the user does not input anything in say six seconds, it will "time out" and continue the program, but I can't seem to figure out how this can be done.*

**Answer:**

This problem is the type that intrigues me. I have never done that either, so I sat down and wrote a program which is shown below. It demonstrates how you can do this. The idea is to use a keyboard read technique — X = PEEK(-16384) — within a loop. In this case the loop index I set is for 600, which amounts to approximately six seconds, and once a second it checks to see if there has been a keypress. If a keypress exists, it can exit the loop and do what needs to be done. Otherwise a normal program flow will continue after six seconds.

```
]LIST

100  FOR I = 1 TO 600
110 X =  PEEK ( - 16384):
      IF X > 127 THEN
      I = 600: NEXT
      : GOTO 140
120  NEXT : END
140  POKE  - 16368,0:
      PRINT  CHR$ (X)
150  END
```


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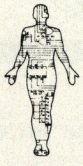

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As you know, one picture is worth a few thousand numbers.

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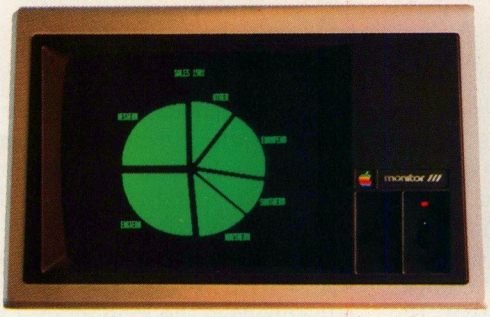
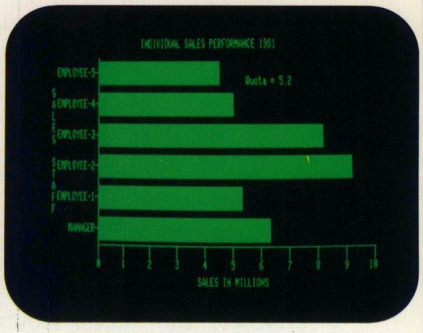
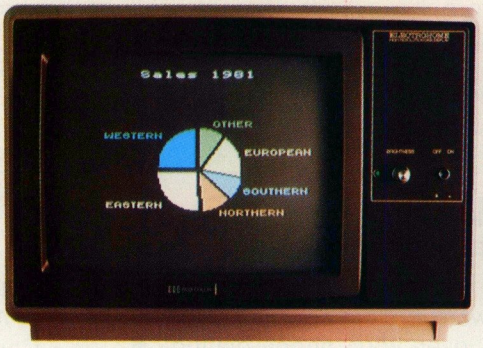
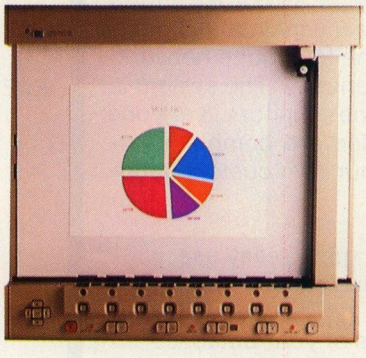


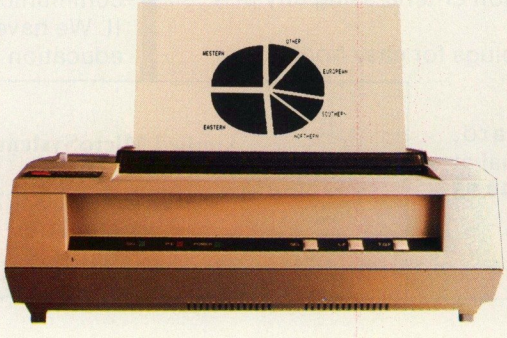


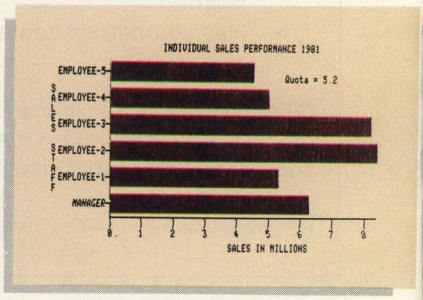



| | Apple | VisiTrend/ VisiPlot | pfsGraph |
|---|---|---|---|
| *Graph Types* | | | |
| Line | Yes | Yes | Yes |
| Vertical Bar | Yes | Yes | Yes |
| Horizontal Bar | Yes | No | No |
| Side-by-side Bar | Up to 4 | 2 | 4 |
| Pie | Yes | Yes | Yes |
| Partial Pie | Yes | No | No |
| Scattergram | Yes | Yes | No |
| Curve Fitting | 5 Kinds | 1 | None |
| *Data Points (Max.)* | 3500+ | 645 | 36 |
| *Plotter Compatible* | Virtually Any | None | H-P7470A Only |
| *Compatible File Types* | Pascal BASIC VisiCalc | BASIC VisiCalc | pfs VisiCalc |
| *Math Functions* | Yes | Yes | No |
| *Available Colors* | 6 | 4 | 4 |

*Apple Business Graphics is available for both the Apple II and Apple III.*





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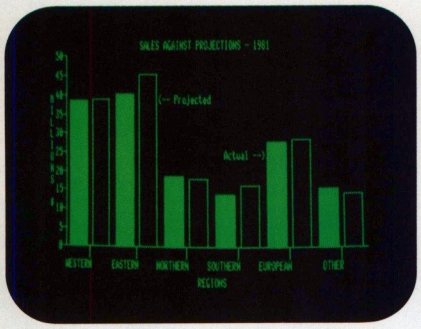


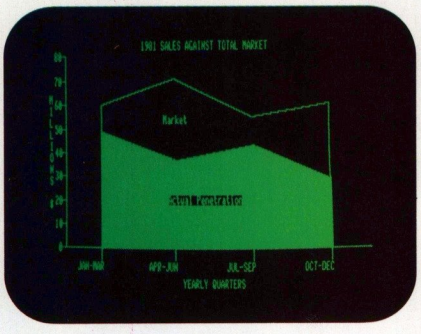


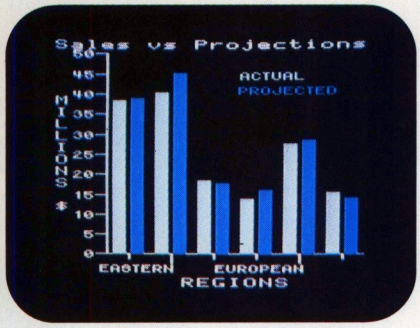


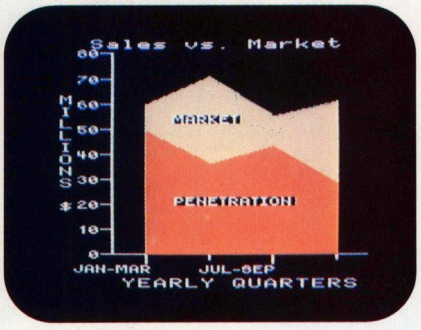


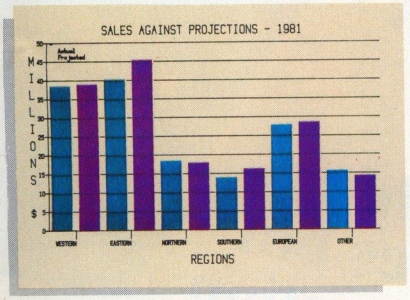


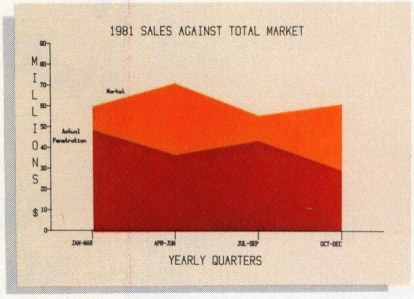


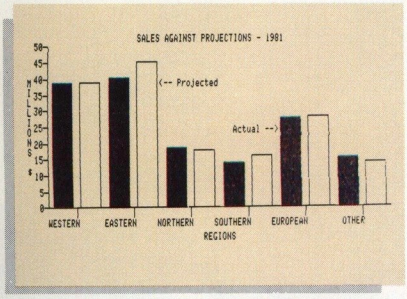


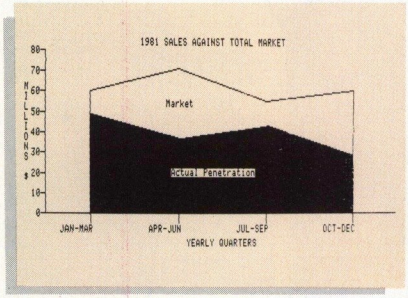


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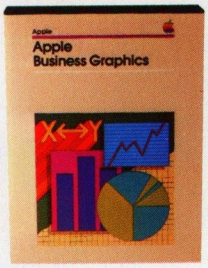


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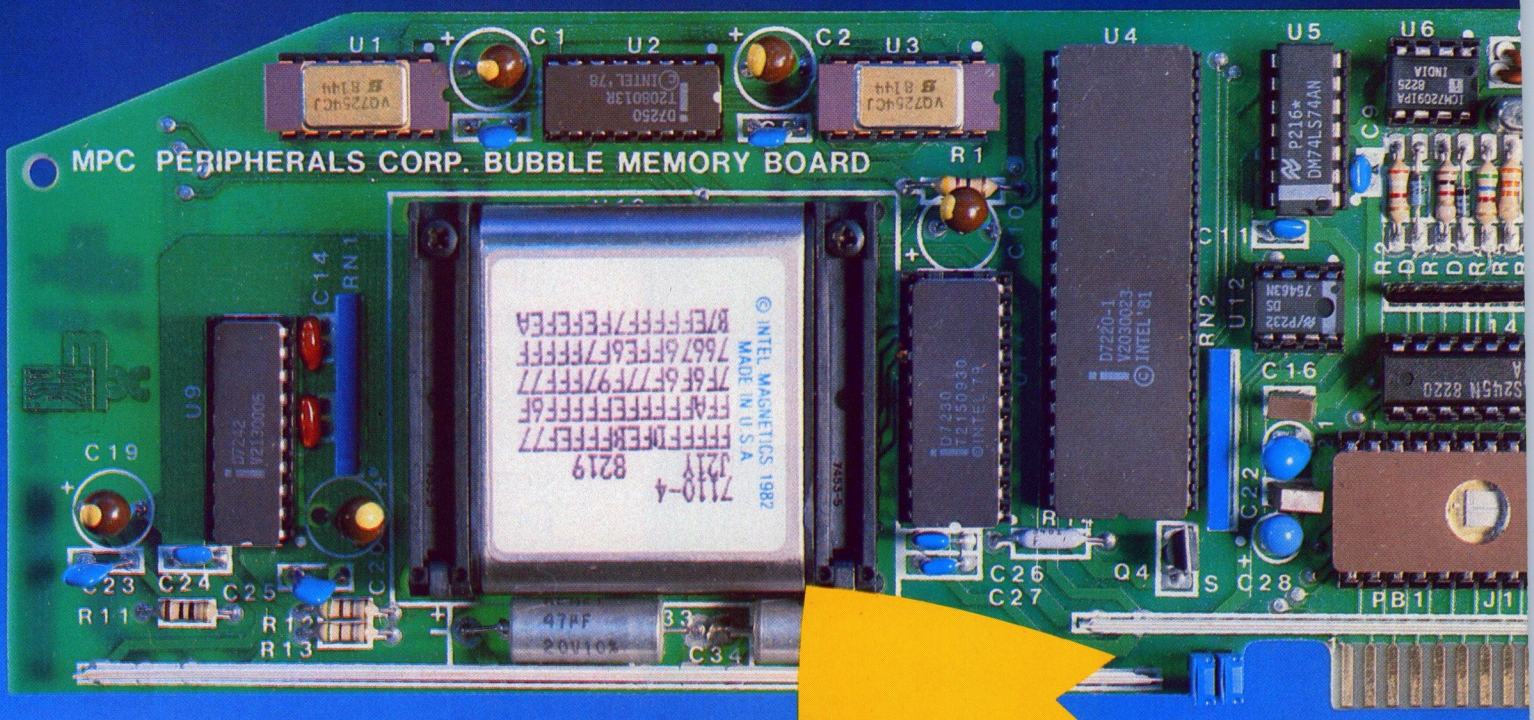


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